VOL. LXXVIII PART FIVE

JOURNAL OF THE ROYAL HORTICULTURAL SOCIETY

MAY 1953

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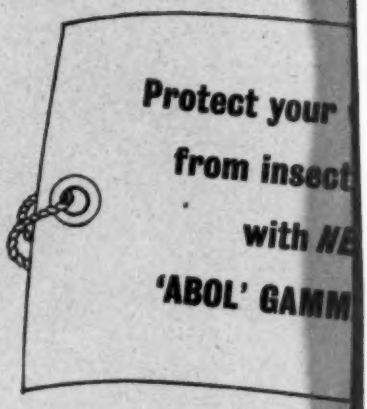
VINCENT SQUARE, LONDON, S.W.1

The science of plant protection



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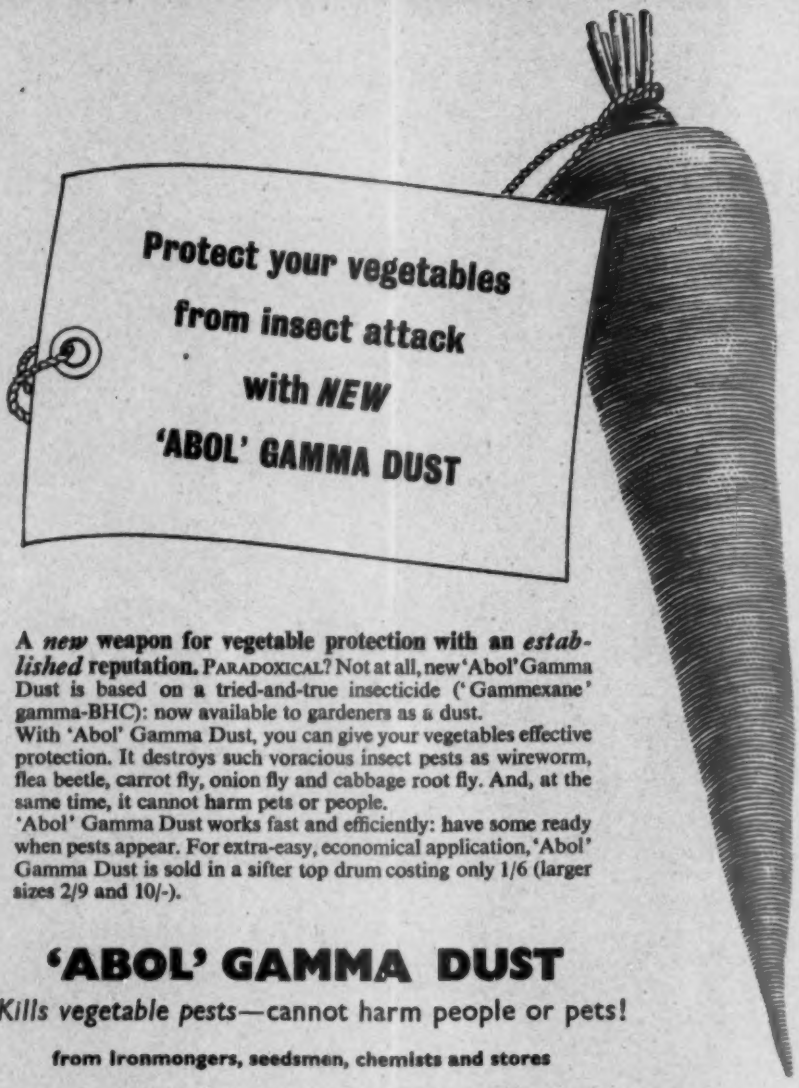

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SAT. MAY 9th
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SAT. MAY 16th
THURS. MAY 21st
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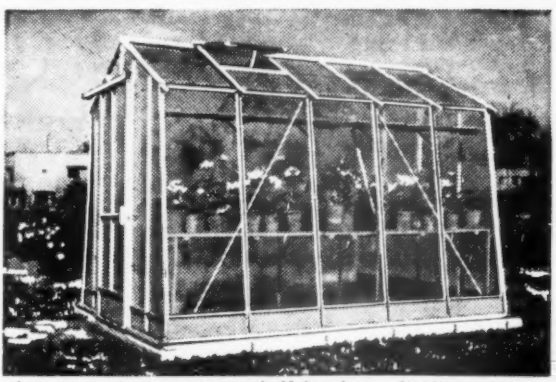

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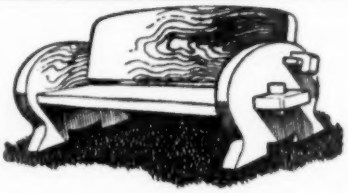

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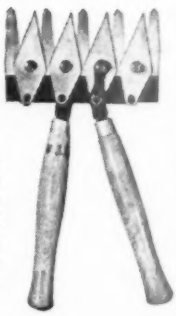

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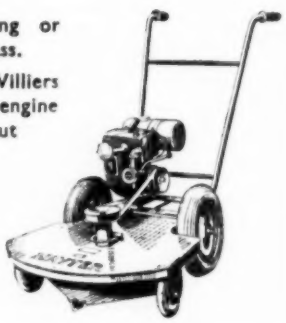

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8/3 10/6 16/6

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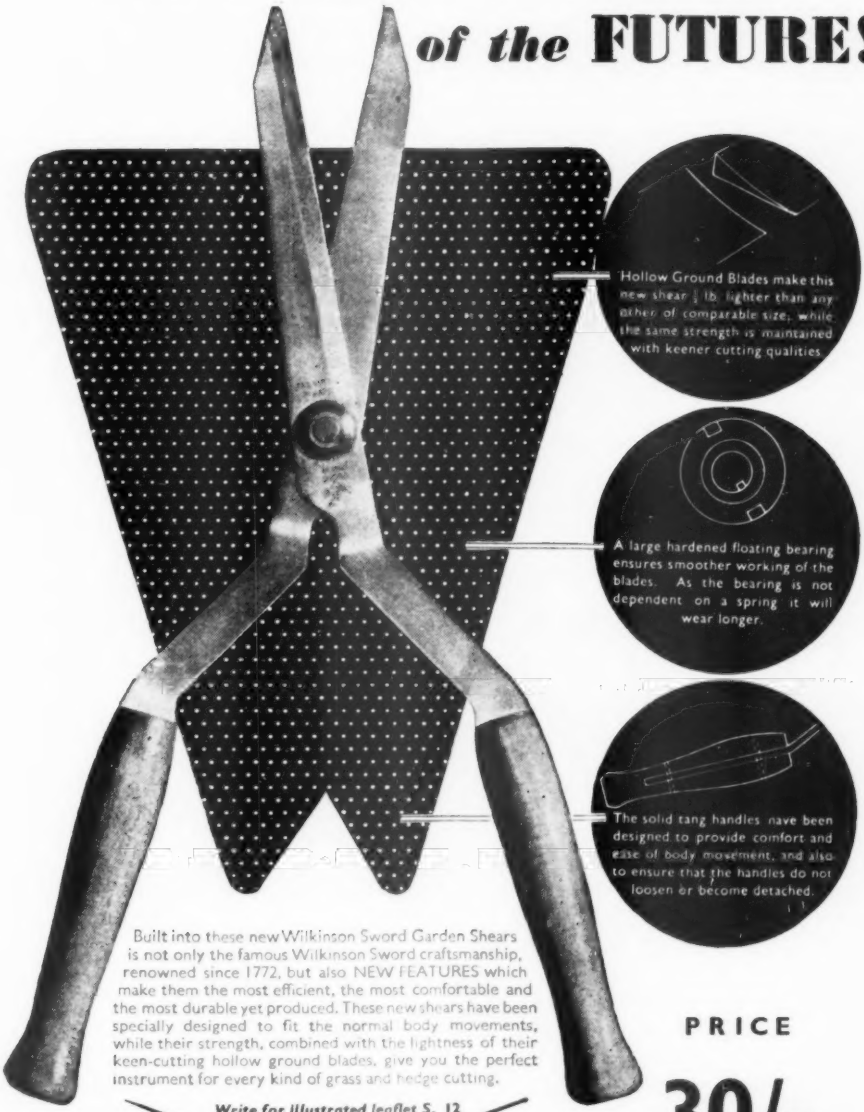

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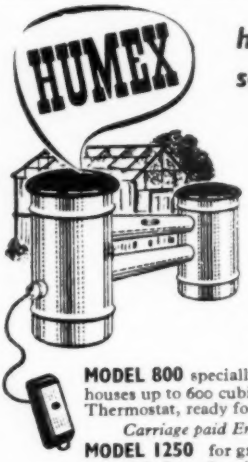

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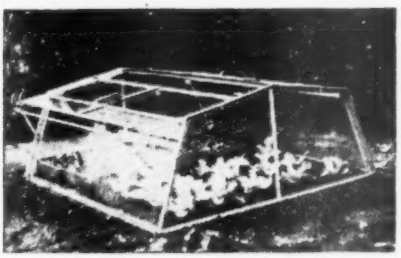

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THE ROSE

THE current issue of " The Rose," which was published on the 20th April, includes the following articles :— " Black Spot and Purple Spotting " (illustrated in full colour) by Aphra Wilson, " Nutrients " by Dr. Stanley B. Whitehead, " Introduction to Growth " by Anne Wylie.

This most successful little journal, printed on high quality paper with full colour illustrations, is available by subscription at 8/6d. per annum (incl. postage) or direct from your newsagent at 2/- per copy.

We shall be pleased to send you further particulars and a specimen copy (while available) if you will kindly write to the Managing Editor, enclosing a 2½d. stamp.

THE ROSE, 26 BLOOMSBURY WAY, LONDON, W.C.1.

A "striking" comparison...

You look almost as miserable as those plants of yours, John. Can I help?

Yes, just take that smug expression off your face for a start. We can't all have your luck with cuttings.

It isn't a matter of luck, old boy. It's a matter of method. Cuttings have got to strike before they will start growing, you know. So I give mine a bit of help.

Tell me how, Bill, before I go on strike!

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JOURNAL OF THE ROYAL HORTICULTURAL SOCIETY

Vol. LXXVIII Part 5

May 1953

THE SECRETARY'S PAGE

ANNOUNCEMENTS—MAY AND JUNE

Shows

TUESDAY, May 19 to FRIDAY, May 22	Chelsea Show. For details see below.
TUESDAY, June 9 12 NOON to 6 P.M. WEDNESDAY, June 10 10 A.M. to 5 P.M.	Fortnightly Show. British National Carnation Society's Pink Competition. Iris Society's Competition.
TUESDAY, June 23 12 NOON to 6 P.M. WEDNESDAY, June 24 10 A.M. to 5 P.M.	Fortnightly Show. Flowering Tree and Shrub Competition. British Delphinium Society's Show. Cactus and Succulent Society of Great Britain's Competition.
TUESDAY, June 30 12 NOON to 7 P.M.	National Sweet Pea Society's Show.

Lectures

TUESDAY, June 9, at 3 P.M. "Mixed Shrub and Herbaceous Borders" by The Hon. Robert James.

TUESDAY, June 23, at 3 P.M. "New Roses" by Mr. Harry Wheatcroft.

Demonstrations at Wisley—The following demonstrations will be given at Wisley, that on the second day being in each case a repetition of that given on the first.

Vegetable Garden

May 6–7. Thinning, Transplanting and Successional Cropping, commencing at 2 P.M.

Flower Garden

May 27–28. The Summer Pruning of Shrubs, commencing at 2 P.M.

The London Floral Decoration Society—The London Floral Decoration Society announces that a Coronation Exhibition of Flower Arrangements will be held in the Old Hall on June 30 and July 1, 1953. The proceeds will be donated to the Gardeners' Royal Benevolent Country Home.

Back Numbers of the Journal—The Secretary wishes to acknowledge with thanks the many back numbers of the JOURNAL which have been returned to the Society in accordance with the request made in the JOURNAL for March, 1953. Where possible these have been acknowledged individually and the postage has been refunded, but in many instances those who were kind enough to send JOURNALS did not give any name and address, and it was therefore not possible to acknowledge receipt at the time.

ARRANGEMENTS FOR CHELSEA SHOW, 1953

Private View – There will be a Private View on Tuesday, May 19, between 2 P.M. and 8 P.M., open only to Fellows and Associates on surrender of the special detachable parts of their annual tickets. For details please refer to the paragraph relating to Fellows' and Associates' tickets below.

In no circumstances, by payment or otherwise, can extra admissions to the Private View be allowed.

Dates of Show – The Show will be held on Wednesday, Thursday and Friday, May 20, 21 and 22, in the grounds of the Royal Hospital, Chelsea, London, S.W. 3.

Times – Fellows and Associates

Fellows, Associates, and holders of Fellows' Transferable Tickets are admitted free of charge during the following periods:

Wednesday, May 20	8.30 A.M. to 8 P.M.
Thursday, May 21	8.30 A.M. to 8 P.M.
Friday, May 22	8.30 A.M. to 5 P.M.

The Public

Admission on payment may be obtained only during the following periods:

Wednesday, May 20	12 NOON to 8 P.M.	Admission	15*s.*
Thursday, May 21	8.30 A.M. to 8 P.M.	,,	7*s.* 6*d.*
Friday, May 22	8.30 A.M. to 12 NOON	,,	5*s.*
	12 NOON to 5 P.M.	,,	2*s.* 6*d.*

In no circumstances can admission be gained at any time on Tuesday, May 19, or before 12 noon on Wednesday, May 20.

Admission of Children – Children under five years of age cannot be admitted. The charge for the admission of children of five years and over will be the same as for adults.

Parties – No reduction in the price of admission can be made for parties of visitors, but tickets may be obtained beforehand to save trouble on arrival. Application, accompanied by a remittance to cover the cost of the tickets required, should be made to the Secretary, The Royal Horticultural Society, Vincent Square, London, S.W. 1, early in May. Such applications *must* reach the Secretary not later than by the first post on Friday, May 15.

Fellows' and Associates' Tickets – A Fellow subscribing 4 guineas annually receives 1 non-transferable and 5 transferable tickets. The non-transferable ticket has a *detachable* portion which will admit only the Fellow to whom it is issued and one other person to the Private View on May 19.

A Fellow subscribing 3 guineas annually receives 1 non-transferable and 2 transferable tickets. The non-transferable ticket has a *detachable* portion which will admit only the Fellow to whom it is issued and one other person to the Private View on May 19.

A Fellow subscribing 2 guineas annually receives 1 transferable ticket. This ticket has a *detachable* portion which will admit only the Fellow to whom it is issued to the Private View on May 19.

An Associate receives 1 non-transferable ticket. This ticket has a *detachable* portion which will admit only the Associate to whom it is issued to the Private View on May 19.

Each Fellow's ticket, both non-transferable and transferable, will admit one person at any time when the Show is open on Wednesday, Thursday, and Friday, May 20, 21 and 22, but the non-transferable ticket may, of course, be used only by the Fellow to whom it is issued. An Associate's ticket may be used only by the Associate to whom it is issued.

Transferable tickets may not be left at the turnstiles for collection by persons visiting the Show later, but may be posted at the Post Office in Main Avenue.

Catering – It is regretted that it is not possible to provide set luncheons and teas, but buffets for the service of light refreshments will be available. There will also be separate enclosures for the service of alcoholic beverages.

Post Office & Telephones – A Post Office for the transaction of ordinary Post Office business will be found in Main Avenue, as will also several Public Telephone Boxes.

Railway Inquiries – British Railways have an inquiry bureau in the Show, situated in Main Avenue on the corner of Crossway.

Band – The Band of H.M. Grenadier Guards will, by courtesy of the Officer Commanding, play each afternoon in the Ranelagh Gardens, where chairs are provided.

Cloakroom – A cloakroom at which bags, parcels, etc., may be deposited will be situated in Main Avenue.

Catalogue – An official Catalogue and Guide to the Show will be on sale in the Grounds, price 1*s*. 6*d*.

Invalid Chairs – The arrangements for the admission of invalid chairs will be as follows:

On Tuesday, May 19, Fellows and Associates in invalid chairs will be admitted between 2 P.M. and 8 P.M. on presentation of tickets for the Private View. There will be a charge of 5*s*. for each chair, and that charge will cover one attendant.

On Wednesday, May 20, no invalid chairs can be admitted.

On Thursday, May 21, invalid chairs will be admitted only between 8.30 A.M. and 12 NOON on presentation of Fellows' or Associates' tickets, or on payment of 7*s*. 6*d*. for the occupant of the chair. There will also be a charge of 5*s*. for the chair, and that charge will cover one attendant.

On Friday, May 22, invalid chairs will be admitted only between 8.30 A.M. and 12 NOON on presentation of Fellows or Associates' tickets, or on payment of 5*s*. for the occupant of the chair. There will also be a charge of 5*s*. for the chair, and that charge will cover one attendant.

The Society cannot arrange for the provision of invalid chairs, but they may be hired from Messrs. Reselco Invalid Carriages Ltd., 262 King Street, London, W. 6.

TRANSPORT

Visitors travelling by car, taxi or coach should alight at the Embankment entrance. Visitors travelling to London will find the following Railway and Bus Services of London Transport operating from the Main Line Termini:

CANNON STREET (*Railway*). District Line direct to Sloane Square. (*Buses*) No. 13 to Charing Cross, thence by No. 11 to Lower Sloane Street, Pimlico Road.

CHARING CROSS (*Railway*). District Line direct to Sloane Square. (*Bus*) Number 11 to Lower Sloane Street, Pimlico Road.

EUSTON (*Railway*). Northern Line to Charing Cross, thence by District Line to Sloane Square. (*Buses*) Number 68 to Strand (Aldwych), thence by Number 11 to Lower Sloane Street, Pimlico Road.

FENCHURCH STREET (*Railway*). Tower Hill direct to Sloane Square.

KING'S CROSS AND ST. PANCRAS (*Railway*). Piccadilly Line from King's Cross and St. Pancras to Leicester Square, thence by Northern Line to Charing Cross, thence by District Line to Sloane Square. Or Circle Line direct to Sloane Square. (*Buses*) Number 77 or 77A to Trafalgar Square, thence Number 11 or 39 to Lower Sloane Street, Pimlico Road.

LIVERPOOL STREET (*Railway*). By Circle Line direct to Sloane Square. (*Bus*) Number 11 to Lower Sloane Street, Pimlico Road.

LONDON BRIDGE (*Buses*). Number 10 to Victoria, thence by Number 11, 39, or 46 to Lower Sloane Street, Pimlico Road.

MARYLEBONE (*Railway*). Bakerloo Line to Paddington, thence by Circle Line to Sloane Square.

PADDINGTON (*Railway*). Circle Line direct to Sloane Square. (*Buses*) Number 7, 7A, 15, 36 or 36A to Marble Arch, Park Lane, thence by Number 137 to Chelsea Bridge Road, Royal Hospital Road.

VICTORIA (*Railway*). District Line direct to Sloane Square. (*Buses*) Number 11, 39 or 46 to Lower Sloane Street, Pimlico Road.

WATERLOO (*Railway*). Northern or Bakerloo Line to Charing Cross, thence by District Line to Sloane Square. (*Bus*) Number 46 to Lower Sloane Street, Pimlico Road.

BAKER STREET (*Railway*). Circle Line to Sloane Square. (*Buses*) Number 2, 30 or 74 to Marble Arch, Park Lane, thence by Number 137 to Chelsea Bridge Road, Royal Hospital Road.

NOTES FROM WISLEY

As the species of Rhododendron were discussed last month it seems not inappropriate that this month we turn to a consideration of some of the hybrids that have been bred from these and from other species. The Wisley collection of hybrids is grouped into three main sections; the hardy hybrid trials, the evergreen and deciduous Azalea trials and a few of the better known hybrids that have been raised mainly in various private gardens.

Approaching Battleston Hill by way of the Broad Walk from the terrace we notice first the double hedge of the deciduous *Rhododendron luteum*, a species whose fragrant yellow flowers appearing this month are followed by a particularly finely coloured autumn foliage. To the right of this hedge is situated the trial of evergreen Azaleas and the Kurume Azalea garden. The evergreen Azalea trial contains some 95 varieties which have been sent for trial since 1938. They consist in the main of the hybrids resulting from crossing *R. malvatica* and *R. Kaempferi* and the various wild colour forms, or colour variants which have been evolved in the garden from a small number of species. These include the Kurumes which are all colour variants of *R. obtusum* var. *japonicum* and the very late flowering race known under the term 'Indicum.' Of the *malvatica-Kaempferi* cross some of the best are 'John Cairns' with flowers of an Indian red darker spotted on the three upper petals, 'Alice,' an orange red, 'Betty,' a bright rose, 'Cleopatra,' a rosy pink and, for those liking mauve, 'Gretchen.' All these are very floriferous with neat compact dwarf habit, absolutely hardy and ideally suited to the small modern garden situated on a lime-free soil. Among the Kurume Azaleas which are equally free flowering but perhaps not fully hardy are 'Azuma Kagami,' sometimes known as 'Apple Blossom,' whose soft pale pink flowers are blotched with phlox pink on the upper petals, 'Hi No Mayo,' a soft pale pink and 'Hi No Degiri,' a bright crimson.

These last three are also included in the Kurume garden which adjoins the trial. In this Kurume garden are planted many of the hardier types in groups of twenty or more plants. Of the main varieties to be found the following may be noted as being of particular interest: 'Kureno Yuki,' a white hose-in-hose with a yellowish green blotch on the upper petal, 'Ukamuse,' a deep porcelain rose, 'Kirin,' with deep rose hose-in-hose flowers and 'Suga no Ito,' a pure pink. The Kurumes are also represented on the south side of Battleston Hill where have been planted the "Wilson 50"—the fifty which the late MR. E. H. WILSON considered to be the best of the Japanese Kurume Azaleas.

On the left of the main path are situated the trials of the hardy hybrid evergreen Rhododendrons and on the brow of the Hill the deciduous Azaleas. These trials were first started by the Rhododendron Association in 1929 at MR. LIONEL DE ROTHSCHILD'S garden at Exbury and were subsequently moved to Wisley in 1938. Many of the original

plants received in 1929 are now well established at Wisley and carry a large quantity of flower each year.

Of the varieties that have received the First Class Certificate after trial there are three fine red-flowered plants, 'Britannia' with a well-shaped truss carrying twelve to fourteen bell-shaped flowers of crimson red, 'Mars' with widely campanulate flowers of a rich crimson, and 'Earl of Athlone,' a bright blood red.

In the paler colours are 'Mrs. G. W. Leak' forming an upright open bush carrying pink flowers with a prominent brown purple blotch, 'Mrs. Furnival' whose funnel-shaped pink flowers are heavily blotched with crimson and 'Marinus Koster' of a slightly deeper pink with brown spotting on the petals. In the yellow range are 'Unique' and 'Letty Edwards' both rather pale of flower.

Having passed through the trials we cross the bridge leading over the public footpath to the main plantings of the newer and choicer hybrids which have originated for the most part from the larger private gardens of this country. And there are now beginning to flower some of the plants which have been raised from seed obtained from crosses made at Wisley since 1946, one of which, 'Moonshine' ('Adriaan Koster' × *litiense*) received the Award of Merit in 1952. Some of the plants on the north side of the hill are arranged in groups in accordance with the gardens wherein they were bred. Thus there are groups of hybrids raised at Bodnant, Exbury, and Tower Court, whilst others, to be found in the Dell and elsewhere, originated at Caerhays, Muncaster and Leonardslee.

Some of the first flowers to greet the early spring are those of the hybrids of *R. moupinense*. 'Tessa' with rich rosy-lilac blooms, which was bred at Tower Court from this species and 'Praecox', appears to be hardier than 'Praecox' and its flowers are much less liable to be damaged by frost than are those of *R. moupinense*. 'Cilpinense' has *R. ciliatum* as the other parent; raised at Bodnant it is undoubtedly one of the best of the dwarfer early Rhododendrons, for it has a neat bushy habit, shining leaves and pinkish white flowers, the depth of pink varying in different forms. Two Exbury plants are 'Bo-Peep' (*lutescens* × *moupinense*) and 'Bric-à-Brac' (*leucaspis* × *moupinense*), the former having flowers of a deep cream whilst the latter opens its white flattish flowers with their beautiful chocolate-coloured anthers about a week before 'Cilpinense.' Blooming with these is a plant of quite a different character, 'Maroze' ('Red Admiral' × *Meddianum*), with spectacular trusses of waxy red tubular corollas at least 2 inches long.

During this month of May we shall see flowering many of the fine hybrids of *R. Griersonianum* and at least three Bodnant crosses should be noted. 'Elizabeth' is one of the best of the Bodnant hybrids of the basic parentage *R. Griersonianum* × *repens*. It is very free flowering, which *R. repens* most certainly cannot claim to be, and tends to grow sideways rather than upwards, thus forming a plant of dwarf habit and close growth, covered with blooms of a startling blood red. 'Matador'

which was awarded the F.C.C. in 1946 has the parentage *R. Griersonianum* × *strigillosum*. A good truss has ten to twelve broad, funnel-shaped flowers which are turkey red, with the upper lobes faintly spotted, and which usually open during the latter half of April. *R. neriiflorum* is the second parent of 'F. C. Puddle' whose semi-pendulous flowers, as one might expect from such a parentage, are of a peculiar brilliant reddish scarlet. A child of *R. Griersonianum* and *R. haematodes* is 'May Day'; bred at Werrington Park it is a rather sparsely-foliaged erect grower with its cerise scarlet flowers borne in loose clusters.

Turning from the scarlet flowers of the above hybrids our eyes can rest on the paler colours of that magnificent hybrid between *R. Fortunei* and *R. Griffithianum* called 'Loderi.' This was bred in 1901 by SIR EDMUND LODER who used particularly fine forms of the two parental species. The named varieties at Wisley are as yet quite small plants only 4 to 5 feet high. These are the result of root-grafting on *R. ponticum* stock in 1946 and even though small they produce an abundance of blossom. 'Loderi' is white or shell pink, 'Loderi' var. 'Sir Edmund' has waxy flowers of blush pink on deeply tinted pedicels, while 'Loderi' var. 'King George' has pure white flowers when grown in the shade and 'Loderi' var. 'Pink Diamond' has flowers of delicate pink. All these plants with their distinctive foliage which is attractive at all times of the year will develop in the course of time into large shapely bushes.

Among the hybrids originating from Exbury are three crosses with *R. discolor* as one of the parents. 'Albatross,' with 'Loderi' as the other parent, produces its large well-formed trusses at the end of the month. The flowers are deep pink in bud opening to slightly bluish pink. Also in the white range is 'Angelo' (*R. Griffithianum* × *discolor*) in which the flowers have pale green spots within, while 'Lady Bessborough' (*discolor* × *campylocarpum* var. *elatum*) is a deeper colour which is best described as stone cream. This hybrid has proved very useful as a parent for further hybridization. Flowering somewhat later is 'Romany Chal' in which *R. eriogynum* and 'Moser's Maroon' are the parents and as might be expected the flowers are of glowing scarlet maroon with dark spots on the upper segments of the corolla.

Three hybrids raised at Tower Court, Ascot, are particularly valuable additions to the Gardens for they extend the flowering season of the genus into the late summer. Two of them are further *R. Griersonianum* crosses. In early June 'Azor,' which has *R. discolor* as the second parent, will open its large pink freckled trumpet-shaped blooms to be followed later in the month by the lax trusses of the white pinkish-tinged flowers of 'Amor' (*Griersonianum* × *Thayerianum*) and in early August by the fragrant pure white 'Polar Bear' (*diaprepes* × *auriculatum*). At Wisley there are many fine specimens of the latter which were among the original plants set out on Battleston Hill prior to the last war.

Among other hybrids there are 'Penjerrick' (*campylocarpum* var. *elatum* × *Griffithianum*) with large pale pink campanulate flowers and

'Moonstone' (*campylocarpum* × *Williamsianum*) which was raised at Caerhays and retains the beauty of its flowers of cream, ivory and pink when planted in the shade. 'Inamorata,' a late June flowering hybrid between *R. Wardii* and *R. discolor*, exhibits the finest characters of both its parents. The flowers are similar to those of *Wardii*, a pale shade of yellow with a small spotted crimson blotch in the throat and its robust habit is derived from *discolor*.

These are but a few of the many hybrids of this remarkable genus which are to be found at Wisley on Battleston Hill, on the Rock Garden and in the Wild Garden and which give colour to the Gardens for nearly six months of the year.

NATIONAL TRUST GARDENS OPEN TO THE PUBLIC

The following properties belonging to the National Trust will be of interest to garden lovers: unless otherwise stated they are closed on Christmas Day and Good Friday.

Where marked * fee includes admission to house.

BUCKINGHAMSHIRE ASCOTT. 2 miles SW of Leighton Buzzard, ½ mile E of Wing, on the S side of A418. Flower garden. Flowering cherries.

Open 2–6: every Thursday and Saturday in August and September; every Thursday and the first and third Saturdays in April, May, June, July. *Admission 2*s. 6*d*. Parties of twelve or more 1*s*. 6*d*.

CLIVEDEN. 3 miles upstream from Maidenhead. Entrance at N end (on B476). Terraced gardens on Cliveden Reach of the Thames.

Open April to October, Wednesdays and Thursdays, 11–6.30. Admission 1*s*.

BERKSHIRE BUSCOT. 3 miles NW of Faringdon on E side of A417. Formal garden, laid out by the late Harold Peto.

Open Wednesdays and Thursdays, 2–6, and also the first Saturday of each month and the following day (Sunday). (April to September). *Admission 2*s. 6*d*. Parties of twenty or more 1*s*. 6*d*.

CORNWALL COTEHELE. On right bank of the Tamar, 2 miles by road W of Calstock, 6 miles SW of Tavistock, 14 miles from Plymouth via Saltash Ferry. Terraced gardens and shrubs.

Open May to September daily including Sundays and Bank Holidays, but not other Mondays, 10–6 or dusk if earlier. October to April, Wednesdays, Saturdays, Sundays, Bank Holidays, 2–6. *Admission 2*s. 6*d*. Parties by previous arrangement 1*s*. 6*d*.

DENBIGHSHIRE BODNANT. 4 miles S of Conway, on the E bank of the river. Entrance by the Eglwysbach road (E of A496). 50 acres of terraced gardens, and specimen trees and shrubs, given to the Trust by Lord Aberconway, President of The Royal Horticultural Society.

Denbighshire—*continued.*

Open April 1st to October 31st, Tuesdays, Thursdays and Saturdays, 1.30–4.45. Admission 2*s.*

DEVON KILLERTON. On the W side of Exeter–Taunton road (A38). Shrubs and specimen trees.

Open always. Admission 6*d.*

OVERBECKS. 1½ miles SW of Salcombe. Flower garden and Magnolia trees.

Open April to September, Tuesdays, Thursdays and Saturdays, 11–6; October to March, Thursdays 10–5. Admission 1*s.*

GLOUCESTERSHIRE HIDCOTE MANOR. At Hidcote Bartrim, 3 miles NE of Chipping Campden, 1 mile E of A46 and of B4081. Laid out by Major Lawrence Johnston. Many rare plants and shrubs.

Open March 1st to November 30th, Wednesdays, Saturdays and Sundays, 2–5. Admission 1*s.* 6*d.*

KENT ST. JOHN'S JERUSALEM. 3 miles S of Dartford, at Sutton-at-Hone, on the E side of A225. Specimen trees.

Open Wednesdays, 2.30–6.30. Admission 1*s.*

LINCOLNSHIRE GUNBY. On S side of A158, 7 miles W of Skegness. Formal garden and herbaceous borders.

Open Tuesdays, Thursdays, May–September, 2.30–7.30. Admission 1*s.*

NORFOLK BLICKLING. 1 mile NW of Aylsham (which is on A140), 10½ miles S of Cromer. Formal garden.

Open May–September, Thursdays and Sundays 2–5. Admission 1*s.* 6*d.*

SOMERSET BARRINGTON COURT. 3 miles NE of Ilminster, at the E end of Barrington, 1 mile E of B3168. Formal garden.

Open Wednesdays, 10.15–12.15 and 2–5. *Admission 1*s.*

MONTACUTE. 4 miles W of Yeovil, on the N side of A3088. 17th-century formal garden.

Open weekdays (except Tuesdays), Sundays and Bank Holidays: April to September, 11–6; October to March, 11–4. Admission 1*s.* Parties of twenty or more 9*d.*

SURREY POLESDEN LACEY. 2 miles S of Bookham station, 3 miles NW of Dorking. Reached via Great Bookham (A246) and thence by road leading S (1½ miles). Herbaceous borders and terraced garden. Gardens and grounds always open, free.

CLAREMONT. On S edge of Esher, on the E side of Portsmouth road. The lake and pleasure garden. Rhododendrons and specimen trees. Laid out by William Kent.

Open from 8 (Saturdays and Sundays 9) to ½ hour before sunset, free.

WINKWORTH ARBORETUM. 3 miles SE of Godalming, on the E side of B2130. 60 acres of hillside planted with rare trees and shrubs.

Open always, free.

SUSSEX BATEMAN'S. ½ mile S of Burwash (A265), by the road leading S from the W end of village. Flower garden and herbaceous borders.

Open Wednesdays, Saturdays, Sundays: March to October, 2–5; November to February, 2–4. Easter and Whit Monday and August Bank Holiday, 11–5. *Admission 2*s*.

WARWICKSHIRE PACKWOOD. 1½ miles E of Hockley Heath (A34), 11 miles SE of central Birmingham. 17th-century Yew Garden in the shape of the Sermon on the Mount.

Open (April 1st to September 30th) Wednesdays, Thursdays, Saturdays and Bank Holidays, 2–7, Sundays, 3–7; (November 1st to March 31st) Wednesdays, Saturdays, Bank Holidays, 2–5; Sundays, 3–5. Closed in October. Admission 1*s*.

UPTON. 1 mile S of Edgehill, 7 miles NW of Banbury, on the W side of the Stratford-on-Avon road (A422). Terraced gardens and rockery.

Open Wednesdays throughout the year and Saturdays in July, August and September, 2–6. Admission 1*s*.

WILTSHIRE THE COURTS, HOLT. 3 miles N of Trowbridge, 2½ miles E of Bradford-on-Avon, in the village on the S side of A3053. Flower garden and herbaceous borders.

Open April to October, weekdays (except Saturdays), 2–5. Admission 1*s*., by the (blue) Stable Entrance. Head Gardener's Tour on Wednesdays.

STOURHEAD. At Stourton (B3092), 3 miles NW of Mere (A303). One of the earliest landscape gardens.

Open April to September, Sundays and Fridays, 2–7; other days (including Bank Holidays), 11–7. October to March, Mondays, Wednesdays, Thursdays, Saturdays (including Bank Holidays), 11–7; Sundays, 2–7 or dusk if earlier. No entry after 6. Admission 2*s*. Organised parties 1*s*.

MONTGOMERYSHIRE POWIS CASTLE. On the SW outskirts of Welshpool. Terraced garden, and work of Capability Brown.

Open from Saturday, May 16th to Thursday, June 11th, and from Wednesday, September 16th to Saturday, October 31st, on Wednesdays, Thursdays and Saturdays only, from 10.30–5; from June 16th to September 12th, daily, except Sundays and Mondays, from 10.30–5. Admission 1*s*.

Full particulars of all National Trust properties are available to members. The minimum subscription of 10*s*. per annum carries the privilege of free entry to National Trust properties, where a charge is normally made.

Further particulars may be obtained from:

The Secretary,
The National Trust,
42 Queen Anne's Gate, S.W. 1.

The above times of opening refer only to the* GARDENS *at these properties.

PLANT HORMONES

THE FERNHURST LECTURE

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(*Delivered to the Royal Society of Arts, on Wednesday, January* 21, 1953, *Sir William Ogg, M.A., Ph.D., LL.D., Director, Rothamsted Experimental Station, in the Chair*)

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THE subject of this lecture is the very general one of plant hormones. The word "hormone" has now got into the vocabulary of the man in the street *via* the daily press, though not with any precise connotation. It is indeed difficult to talk about a subject without defining it, so I shall begin by being a little historical.

The term "hormone" was minted in 1902 by BAYLIS and STARLING, and it is derived from a Greek word meaning "I arouse to activity." Hormones denote chemical substances secreted by the endocrine glands which, when carried by the blood stream to another organ, affect the functioning or activity of that organ.

Hormones have also been thought of as "chemical messengers." What do they do? To answer this question we must realize that all animals possess certain tissues and organs performing different functions, and carrying on special activities. The entire body has to work as an integrated and harmonious entity. No one part or tissue has to get out of step. Organs and tissues must therefore in some way be subject to a system of co-ordinating controls. These controls are, so far as animals are concerned, of two kinds. There is first the nervous system, which "may be likened to an intercommunicating network of telegraph wires centring in the brain, spinal cord and ganglia." Second there is a complex system of hormones or chemical messengers emanating from the endocrine glands which by altering the activity of an organ, also affect the activity of others. The hormones act as a sort of balance wheel to enable the metabolic processes of the organism to function in an optimum way, and also to buffer or to minimize the evil effects of violent fluctuations of the environment. It will be sufficient to mention one or two animal hormones. Adrenaline, or epinephrine, is a hormone secreted by the adrenal glands. In periods of stress brought on by fear, rage or hunger, there is a discharge into the blood-stream of a much larger amount of this substance than usual. There is a rise in blood pressure and a general mobilization of bodily forces which enable the organisms to meet the emergency.

Another hormone is insulin, which is secreted by the pancreas and has to do with sugar metabolism and with the control of the blood sugar level. Failure of insulin production brings about the disease known as

diabetes, and the therapeutic use of insulin for this disease is now well known.

Animal hormones have now been studied for fifty years and a great deal is known about the chemical and physiological properties of the thirty or more which have so far been identified.

A plant is also an association of different tissues and organs which require the same kind of co-ordination as we have seen to be necessary in animals. Plants have no nervous system and any co-ordination must therefore be through other mechanisms. It can be shown that there are in plants chemical substances which are formed in one part of the plant; they pass to other parts; they produce special growth effects, and they are thus entitled to be known as plant hormones.

HORMONES AND ROOT GROWTH

An example of hormonal regulation in a plant is provided by the relationship between roots and leaves. By means of special techniques it is possible to grow excised roots in an aseptic culture medium. If this medium contains the right substances in the right amounts, these isolated roots grow as fairly normal roots. The medium first employed was one containing a complete array of mineral salts, with added sucrose, to supply the carbohydrate normally transported from the leaves to the roots. In successive transfers of flax roots to fresh media it was found that growth became poorer with each successive transfer. The roots needed something for growth which they were either not getting at all or which they were making in too small an amount. The necessary substance proved to be the well-known vitamin thiamine, and it was needed in the very low concentration of one part to ten million. When supplied the roots grew well.

The nutritional requirements of Tomato roots are somewhat different, and vary somewhat from strain to strain. Some strains need not only thiamine, but also pyridoxine, nicotinic acid, or both these substances.

How does the root obtain its supply of thiamine and other necessary substances? It can be shown by some simple ringing experiments that in the Tomato plant thiamine accumulates above a stem girdle between the root and the stem, and also above rings at the base of the leaves.

Absence of thiamine from the nutrient solution produces characteristic symptoms. Cell division slows down and finally ceases. Thiamine is therefore a factor influencing cell division. It is also a factor influencing respiration. Pyridoxine is concerned with the synthesis of amino acids; nicotinic acid has to do with respiratory enzymes. All three substances thus play an essential part in the biochemical economy of the plant.

It has been known for many years that most animals including man require thiamine and other vitamins of the B complex as essential constituents of their food. These vitamins are made by plants, not to prevent deficiency diseases in animals or ourselves but for their own growth and well being.

LEAF GROWTH HORMONES

Just as there are root growth hormones, there are also leaf growth hormones. If, for example, immature leaves of the pea plant are excised and placed in a nutrient medium containing the usual mineral salts and sugar, they grow very little. But if the amino acid adenine is added growth is promoted. Adenine thus functions as a leaf growth hormone in the pea plant. When tried with leaves of certain cereals, however, it was without effect. It is therefore likely that different species of plants need quite different substances to play the role of leaf growth hormones.

STEM GROWTH HORMONES

These comprise a series of hormones which are synthesized in the apical bud or young extended leaves and then transported to the elongating parts of the stem. If you take a section from the growing region of a pea plant which has been kept in the dark, and place it in a nutrient solution containing mineral salts and sugar, there is practically no growth. But if a small amount of the substance IAA (indoleacetic acid) is added, there occurs a very rapid elongation of the excised section.

This substance, IAA, is therefore proved to be instrumental in speeding up the growth of stem tissue. It works also in very low concentration, since only about ten parts per million are required to bring about the effect. Growth substances such as IAA and related compounds are known as auxins. Auxins are concerned not only with stem elongation but also with other growth co-ordinating processes within the plant. The main point to bear in mind is that the hormone principle is evoked to bring about a correlated and harmonious integration of the whole plant.

MORE INSTANCES OF HORMONE EFFECTS

We have so far seen that the growth of a plant organ such as the root partly depends on minute quantities of chemical substances transported from other parts of the plant. The techniques of tissue culture enable us to identify some of these substances.

It is now possible to grow the excised ovaries of Tomato in a culture medium. The tiny ovaries are excised shortly after pollination and placed in a medium supplemented by the juice of either green or red tomatoes. This juice presumably contains substances necessary for growth which are probably transported to the ovary from other sites, but neither the sites nor the chemical nature of the substances are known. Lately it has been discovered that the substance NOA (naphthoxyacetic acid) acts as an adequate substitute for tomato juice. The cultivation of fruits in artificial media obviously has exciting possibilities for the future.

NUTRITIONAL NEEDS OF PLANT EMBRYOS

Minute and only partly developed embryos can be caused to develop by using an artificial culture medium supplemented by additional substances in low concentration. These include some vitamins of the

B complex such as thiamine and pantothenic acid. Other unidentified compounds are known to be contained in yeast extract, malt extract, and coconut milk. The growth of mature embryos can be speeded up by addition to the medium of thiamine, biotin, nicotinic acid, and other special substances.

WOUND HORMONES

When wounds in plants begin to heal the formation of new tissues appears to be started by particular chemical substances liberated from injured cells. These wound-produced substances may also be counted among the plant hormones. If a Potato tuber is cut, the surface soon becomes covered by a layer of corky cells, but if the injured surface is washed just after cutting the layer of healing cells is not formed. One wound hormone has been isolated from injured Bean pods. It is known as traumatic acid. It is not effective with tissues other than those of the Bean and it seems likely that different species of plants are characterized by wound hormones of chemically diverse types.

To sum up: the growth of a plant is controlled and integrated by many growth hormones, each produced in a particular organ and transported to other organs or tissues. A knowledge of these substances has thrown light on such old questions as the reason for the bending of plants towards light and the response of plants to gravity.

TECHNOLOGICAL APPLICATIONS OF PLANT HORMONES

It will have been noticed that the substances which we have postulated as fulfilling the original definition of a growth hormone are not usually thought of in this sense so far as the animal world is concerned. The animal physiologist would not regard thiamine as a hormone, nor would he consider the new antibiotics which promote growth in animals as falling within this category. The term plant hormone is now used in a much wider sense. Two American investigators define a plant hormone as follows: "a hormone is any organic chemical substance, naturally occurring or synthetic, which in very low concentrations affect growth or metabolism—at the site where naturally produced, or applied, as well as at sites to which it may be transported." If I discussed plant hormones in the restricted sense of the earlier use of the term, I should not be able to refer to the technological applications of what should more properly be called growth regulating substances, or more simply growth factors. For out of purely academic investigations on the phenomena of growth, largely carried out by plant physiologists, have emerged discoveries of the greatest importance to agriculture and horticulture. We are now embarking on a complete chemical overhaul in agricultural practice, and I hope now to outline some of these new developments.

Indoleacetic acid

The hormonal function of IAA (indoleacetic acid) was first discovered in 1934. It was the first naturally occurring hormone to be identified,

although MAJIMA and HOSHINO of Japan had synthesized it as early as 1925.

In 1935 ZIMMERMAN and WILCOXON announced the discovery of other organic synthetic substances with hormonal properties. The most important of these were: NAA (naphthalene acetic acid); and IBA (indolebutyric acid.

In 1938 LEVINE established that another substance behaves as a hormone: NOA (naphthoxyacetic acid).

In 1942 ZIMMERMAN and HITCHCOCK reported on the effects of yet another synthetic compound on plant growth: 2, 4-D (2, 4-dichlorophenoxyacetic acid).

In 1943 ZIMMERMAN found that 2, 4-D induced hormonal responses in plants. These four synthetic hormones, all discovered within a period of eight years all produce hormonal responses, but to different degrees. Their discovery and commercial possibilities led to an enormous expansion of research in which the principal roles have been played by the research laboratories of the chemical industry, and by plant physiologists working in government experimental stations, in research institutes and to a minor extent also in universities.

The list of synthetic substances with growth regulating properties which can be used in agriculture and horticulture is now very large, and it would serve no useful purpose to refer to any of them individually. I must, however, stress the fact that twenty years ago the gardener or farmer of enquiring mind knew nothing about plant hormones. It is only in recent years that their exploitation has become what our American friends like to call a multi-million dollar industry.

It will be of interest to enumerate some of the things which plant hormones can do, and for which they are used at the present time.

1. Weed control.
2. Cause flowers to remain on a tree.
3. Cause flowers to drop off.
4. Produce fruits without pollination.
5. Prevent the formation of fruit.
6. Cause more fruits to develop.
7. Cause total or partial elimination of fruits.
8. Produce earlier fruits.
9. Produce later fruits.
10. Produce seedless fruits.
11. Produce fruits with more seeds.
12. Induce root formation (on cuttings).
13. Prevent the sprouting of tubers (Potato).
14. Cause defoliation.
15. Enable difficult plant hybrids to be made.

This list is a formidable one, and it will be readily seen that these practices do represent an enormous advance in agricultural techniques and that we are veritably in the middle of an agricultural revolution.

The late SIR DANIEL HALL once said that there were only two major discoveries which science has made to agriculture; one of these was the discovery of artificial manures; the other was the discovery of the laws of Mendelian inheritance. I think that it may now be safely said that the discovery and proper use of growth regulating substances is a third major contribution which science has made to agriculture.

1. *Weed control*

It will have been noted that the discovery of the hormonal properties of the substance 2, 4–D took place in 1942. By 1948 twenty-seven and a half million pounds of 2, 4–D were being manufactured annually for agricultural use, in the United States, more especially for weed eradication or control. This substance is especially toxic in certain concentrations to broad-leafed weeds, and by spraying it inhibits the growth of these. Applied to the soil it prevents the germination and development of weed seedlings. The average rate of application is about one pound per acre, and it may therefore be estimated that in 1948 about twenty-five million acres were treated in the United States. The use of 2, 4–D is favoured by the fact that grasses and cereals are quite resistant except when young, and as broad-leafed dicotyledons are very sensitive, this enables cereal crops and lawns to be freed from bad weeds of this type with relative ease; 2, 4–D is so potent that a few pounds of the chemical would be enough to affect the growth of the whole of most dicotyledonous crops in this country.

2. *Prevention of pre-harvest drop of fruit*

The second largest outlet for the use of plant hormones is for the prevention of pre-harvest drop in fruit. The weed-killing substance 2, 4–D has also been used for this purpose, and also for accelerating the ripening of green bananas and apples. There are now many proprietary products on the market, but chemically they all appear to be naphthalene acetic acid (NAA) or a new substance, 2, 4, 5–trichlorophenoxypropionic acid.

Pre-harvest drop of Apples has been a headache for the fruit grower for a long time, and one of the first uses of hormone sprays was to reduce this source of loss. NAA is applied as a spray at a concentration of ten parts per million or as a dust at 0·1 per cent. The time of application is just as soon as much dropping becomes evident. The substance 2, 4, 5–trichlorophenoxypropionic acid (2, 4, 5–TP) is effective in controlling fruit drop and is also said to improve colour. Varietal differences affect the efficiency of the particular chemical substance used. NAA does not work very well with some varieties whereas 2, 4–D has been a success.

Hormonal control of fruit drop in Oranges is now a well-established practice in California. This is of great practical importance as fruit drop formerly caused great loss of crop—amounting to as much as 25 per cent.

at the end of the season. Following the lead of the Apple growers, spraying with NAA was first tried, but proved useless. However, the alternative substance 2, 4-D, previously referred to as a weed-killer was found to work. It is applied as a water spray in the low concentration of only eight parts per million. In an oil-water emulsion the even lower concentration of four parts per million has been found practicable.

3. *Elimination of excess fruit*

The problem of how to deal with too much fruit in Apples and other fruits has also been the subject of experiment. Hand thinning is of course an expensive operation. Here the same substance NAA is used at low concentration, and is applied at the flowering stage or shortly after.

4. *Hormones in horticulture*

(*a*) Prolonging the blooming period

The use of hormones in horticulture is now widespread for a great variety of purposes. They will prolong the flowering period of such trees as the flowering Cherry (*Prunus spp.*).

In periods of warm weather the flowers open rapidly and shed quickly, and spraying with NAA or allied compounds will cause the flowers to stay on the trees much longer. The spray should be applied when most of the flowers are fully open. Not all ornamental trees respond to treatment. Azaleas do not respond, nor do Crab Apples, flowering Quinces nor Magnolias.

(*b*) Preventing Holly leaves from dropping

NAA is highly effective at a concentration of 20 parts per million.

(*c*) Preventing fruit production in flowering trees.

Several compounds are used, depending on the species involved. HAA works with some species (*e.g.* Horse Chestnut) but not with others (some types of purple Crab Apple).

A compound so far not mentioned, maleic hydrazide was found to prevent the fruiting of the Maidenhair tree (*Ginkgo biloba*).

(*d*) Rooting of cuttings

It is common knowledge that some plants can be grown very easily from cuttings and others not at all. Hormones can be used to hasten rooting and to increase the number of roots formed in a given time, but they will not cause roots to form on material that normally does not root, nor can the use of hormones replace horticultural skill. There are many synthetic products in commercial use and these are mainly IBA (indolebutyric acid) and NAA (naphthaleneacetic acid) together with related compounds.

(*e*) Producing fruits without pollination

If you plant a Holly tree in your garden you may not get any fruits. This is because some trees are males and cannot fruit, or because the

tree is a female and there is no male near at hand to supply pollen. A hormone spray will induce abundant setting of fruit, not only in Holly, but also in Tomatoes, Fuchsias, and many other plants.

Seedless tomatoes can now be produced to order by using a large range of compounds.

Indolebutyric acid is recommended, but there are now many others.

On a small scale spraying can be done with a hand atomizer. The spray is applied when the flower is fully expanded and repeated applications are necessary throughout the season at intervals of about a week.

(*f*) Preventing Potato and stored nursery stock from sprouting

Large-scale users of potatoes have suffered heavily in the past from premature sprouting. The potatoes are usually stored at a temperature of 40° F. or somewhat higher, and much sprouting is evident after a few weeks' storage at this temperature. Hormone treatment can be used for inhibiting the growth of sprouts. A good method for the small gardener is to use a handful of confetti impregnated with hormone to each bag of potatoes. The hormone used is naphthaleneacetic acid in the form of its methyl ester.

It is often necessary to store various plants such as young fruit trees and Roses for relatively long periods of time, especially in spring. Many plants sprout after a short rest period and use up their food reserves, then when planted out they either fail to survive or grow very slowly. The same hormone which is used for potato sprouting can also be used for Roses and young fruit trees.

Hormones and the Pineapple Industry of Hawaii

The Pineapple industry of Hawaii is probably the most efficient agricultural large-scale enterprise in the world. It is therefore not surprising that the fullest advantage is taken of the immense possibilities of plant hormones for the control of growth.

Hormones are used to bring varieties into flower at convenient times. Some varieties are slower to flower and take as long as five years. An old practice was to smoke the plants by means of large bonfires, using tents to confine the smoke. The current use is to spray with NAA at a concentration of about one ounce per acre using large power sprayers. Only one application is necessary. The advantage of uniform flowering is very great since before hormone spraying came into use, the crop extended over a period of several months. Now that the whole field can be made to flower at once, all the plants fruit over a very short period. Uniformity of fruiting means increased yields, and exact timing of picking in different fields is now possible. As soon as one field is finished another is just ready for picking.

An interesting sidelight is that NAA induces a very long and weak stem. Another hormone is used to counteract this. Spraying with betanaphthoxyacetic acid delays the ripening of the fruit, increases its size, and at the same time strengthens the stem.

The use of hormones for making difficult plant hybrids

Hybridization between varieties within a species is usually easy. Hybridization between different species in a genus is more difficult and depends very much on the genus and on the species. Some species crosses are easy and others difficult or impossible.

One frequent cause of lack of success is the fact that even if one or two seeds do result from the application of pollen from a different species, the fruits drop off or do not mature. Or the pollen tubes grow so slowly that the flower drops off before fertilization is effected. Many new hybrids, formerly considered to be impossible have now been made with the aid of plant hormones.

RICK in California has even succeeded in crossing the Tomato with a wild species of Solanum native to Southern Peru. He used the substance parachlorphenoxyacetic acid in a concentration of 0·01 per cent. in lanoline.

THE FUTURE OF PLANT HORMONES

It will be apparent from the short account which I have given of the current position of the use of hormonal regulators of plant growth, that spectacular progress may be expected in the future. In my own field of interest which is mainly that of breaking the present barriers to crossing representatives of different genera, it is apparent that we are in the beginning of a new era of untold promise. A large number of hitherto intractable species combinations have been made though few workers are employed in this field. The control of some important plant diseases and insect pests can best be done by incorporating resistance genes from allied species and genera. The scope of plant breeding is thus greatly enlarged by these new perspectives.

With regard to weed control it is likely that the newer methods of chemical and hormonal control will result in far-reaching changes in agricultural practice. The planting distance of Maize at present is about 42 inches by 42 inches—the check row system has been evolved to permit of weed control by cultivating both ways. If pre-emergence soil treatment could control weeds effectively—and we seem well on the way to this—the planting distance could be reduced, and the yield probably increased by a more intensive cultivation of the soil, permitting the use of more fertilizer.

From the standpoint of the plant physiologist it would seem that the characters of plants are not so fixed as was thought. If the flowering time of grasses could be delayed it might be possible to maintain a permanent leafy sward, and radically change the composition of the crop for feeding purposes.

Other modifications may be anticipated. Delayed flowering and quicker maturity may permit plants to be grown outside of their normal climatic zones, and the production of parthenocarpic fruits—seedless fruits—will certainly increase. Already almost the whole of the Fig industry of California has gone over to seedless fruits, and this is the

only industry which has so far done so. There is some evidence that hormone-produced fruits may be different in chemical composition from those naturally set. It is reported that seedless tomatoes are sweeter.

At present the field of application of this new chemical knowledge is being restricted by lack of fundamental knowledge of the precise way in which they act. Additional uses will certainly be found for the new chemical substances which are now being turned out in ever-increasing quantities.

All the facts which have been mentioned concern the phenomenon of growth—of the factors which control the velocity and regulation of cell division. A study of growth is an exploration of the most fundamental of the properties of living matter of the whole organic world. It is in this study that the points of view of workers in many varied disciplines will coalesce. Any new facts about growth in any organism may profoundly affect knowledge about man himself. The biochemistry of the behaviour of the excised roots of Groundsel may seem unconnected with fundamental problems of human disease, but the biochemistry of life comprises an integrated and interlocking series of interrelated facts and any fact about one organism may tie up in quite an unforeseen way with another fact about another organism. "They also serve who only stand and wait" applies to facts as well as to individuals.

MY IRIS BORDER*

H. J. Randall, C.B.E.

ALTHOUGH English summer weather is notoriously fickle we generally have at least a few weeks of warm sunshine. This enables flowering shrubs, tall bearded Irises and other plants to be ripened sufficiently to provide a wealth of bloom *in the following year*. For the Irises this period of ripening is essential if perfection is to be attained.

The summer of 1951 was of such exceptional gloom and wetness that certain crops failed, and many plants entered upon the winter in no fit state to withstand the cold. As a result the flowering season of 1952 was, in some respects, the poorest for many years, and Irises were amongst the sufferers. Fortunately the summer of 1952 was much better so that at the time of the Coronation there should be a blaze of flower and colour in every Iris border.

The coloured photograph (Fig. 51) was taken in 1952 when, because of the poor summer in 1951, there was not half the quantity of bloom usually enjoyed; and it was taken after some varieties had finished flowering for the year. Yet it gives a good idea of the tones

* This article deals mainly with the tall bearded Irises and not with the several hundred species and their most interesting hybrids.

Photo, J. E. Downward

FIG. 51—Iris Border in MR. H. J. RANDALL's garden at Woking, Surrey (See p. 166)

Photo, J. E. Downward

FIG. 52—Iris 'Cliffs of Dover' in MR. H. J. RANDALL's garden (See p. 168)

Photo, J. E. Downward

FIG. 53—Iris 'Starshine' (See p. 169)

Photo, J. E. Downward

FIG. 54—Iris 'Belle Meade' (See p. 169)

FIG. 55—*Hemerocallis* 'Dorothea'

Photos, Gretchen Harshbarger

FIG. 56—*Hemerocallis* 'Georgia' (See p. 176)

FIG. 57—*Hemerocallis* 'Gretchen'

FIG. 58—*Hemerocallis* 'Reliant'

Photo, H. F. Dovaston

FIG. 59—***Delphinium muscosum***, *Ludlow, Sherriff & Hicks* 19399, from seed sown January, 1950, flowering at Auchincruive, Ayr, July, 1951 (See p. 182)

Photo, G. H. Wilde

FIG. 60—*Hemerocallis* 'Pink Delight'

and colours now seen amongst Irises, and it explains why an Iris border can be the centre of attraction in any garden during the flowering season.

In the left corner of the photograph is a clump of the pink Iris, 'Melody Lane.' This is typical of a whole series of pink varieties, nearly all of them with reddish beards, which are nowadays so popular. Some have wider petals and more flaring falls, and are shorter in growth. Others, like 'Dreamcastle,' are taller and more orchid-pink in colour, but they all seem to be good neighbours in the border, and when planted near pale blue varieties they make a delightful combination. Slightly above 'Melody Lane' in the picture is 'Cherie,' another famous pink Iris, and there are clumps of other pink varieties dotted about the border. Beyond the wooden posts are several rows of pink seedlings, and also seedlings of other colours, all of them varying in quality, and about each of which I could say with Touchstone that it is "an ill-favoured thing, Sir, but mine own." The raising of new seedlings is one of the most fascinating branches of Iris growing, but it is important that hybridizers should use first-class parents and not trust to the haphazard work of bees.

To the right of the picture, in the foreground, is 'Amandine,' a creamy yellow which appeals to those gardeners who do not like "hot" yellows in the Iris border. Another excellent flower of similar colouring but taller in growth, is 'Desert Song'; but that is farther down the border. For those who favour vivid yellows there are many now available at moderate prices—'Joan Lay,' 'Ola Kala' and 'Berkeley Gold,' for example—and if these are planted at regular intervals they enliven the whole border. The unfortunate absence of a bright yellow amongst the reds and purples in the centre of the coloured photograph is an example of bad planning. New varieties of yellow Irises are now appearing with more ruffled petals and greater clarity of colour than many of their forebears; and some of them have patches or edges of white which add to their general attractiveness.

Just above 'Amandine' in the border is a large clump of 'Blue Rhythm,' one of the most reliable of the blue Irises. On the extreme left, between the pinks, is 'Chivalry,' which flowers so well at Wisley and in many other gardens. Spaced along the border are other clumps of pale blues, many of them seedlings from two splendid parents, 'Helen McGregor' and 'Cahokia,' and these provide a foundation upon which any colour scheme can be built. Pale blue is perhaps the most popular colour amongst Irises, and we are fortunate nowadays in having varieties which are really blue and not merely lavender, and which also have size, flaring falls and ruffling to commend them. Amongst the darker blues there are some excellent ones to choose from. 'Blue Ensign' and 'Mrs. J. L. Gibson' are inexpensive favourites, whilst a newcomer, 'Pierre Menard,' is becoming available for the expert in hybridizing.

In the very centre of the picture is 'Vice Regal,' a fine reddish-purple from Canada, and just beyond it is 'Fort Ticonderoga,' one of the best

of the coppery reds. Irises in shades of these two colours, together with those loosely described as black, give a richness or body to any Iris border. Which are the best ones to grow is a matter of individual taste, and gardeners are advised to see the exhibits at Chelsea or the Iris Show, at Wisley or in private gardens. Splendid dark varieties are 'Black Forest' and 'Sable,' but amongst the newcomers to the Iris world are several which are taller and even darker. The best of these yet seen in England is 'Black Hills,' which created great interest at the 1952 Show of The British Iris Society.

Two varieties growing at the back of the border, but not clearly seen in the photograph, are the tall-growing 'Violet Symphony' and 'Mulberry Rose.' These may not be suitable for the show bench, but in the garden they flower freely and make outstanding clumps. With the early morning sun upon it 'Mulberry Rose' can be very beautiful in spite of what are sometimes regarded as faults, such as drooping falls and heavy marking round the beards, generally called "striation."

Whether or not white Irises should be grown in a border of mixed Irises is a debatable question. In some gardens whites are grown in special beds away from the others, but I have a limited number of them interspersed amongst the rest. Near the centre of the picture is a clump of 'New Snow' which, with its strong growth, ruffled petals and semi-flaring falls, will probably become one of the standard varieties. Most of the older white Irises had yellowish beards, and the yellow certainly made an effective colour contrast. White seedlings are now appearing with reddish or blue beards, but to me the most attractive of all Irises are pure white ones, with beards to match, having ruffled petals with a glistening surface. And in this direction the modern hybridizer is producing wonderful results. One of the monochrome photographs (Fig. 52) is of a newly planted clump of 'Cliffs of Dover,' raised in America and named as a compliment to this country. It is a milk-white variety with beautiful ruffling, and if it develops adequate branching it will approach my idea of a perfect Iris.

During the past few years brown Irises have been improved beyond recognition. The early ones were rather drab and poor in shape, but nowadays they are rich in colour, the petals are broader and the shape better, and they have a general air of distinction. Several of the best are 'Argus Pheasant,' 'Pretty Quadroon' and 'Good News' from America; and there are a few raised in this country which are not unworthy of attention. Both in the garden and at flower shows these brown Irises always arouse considerable interest.

A very showy section of the Iris family is the 'variegata,' with yellow standards and red falls. This contrast is so vivid that it sometimes spoils the harmony of the softer shades to be found in other Irises growing nearby. For several years I have grown my variegatas in a place apart, but for 1953 I shall have a clump of 'Staten Island,' perhaps the best of them all, right in the centre of the main border. If it should prove too startling in that position it will be moved elsewhere for 1954.

Herein lies one of the pleasant features of growing Irises—the constant experiment, for those who have the time and inclination, in the grouping of different varieties to find the ideal combination of colours. The late MISS PESEL, who did much work in designing embroidery for Winchester Cathedral, was expert in grouping her Irises in a pleasing and artistic manner. Nowadays MRS. ANLEY of Woking and MRS. MURRELL of Orpington have the same happy skill in harmonizing colours, and I have to admit that ladies are far more adept than men at this important branch of gardening work.

Although they cannot be picked out in the photograph the border has several clumps of "plicatas"—Irises which usually have a background of white or yellow with dots or stipplings of a darker colour such as blue, brown or red. These flowers can be very effective either in the garden or when used for interior decoration. Some of the markings are so light as to be scarcely noticeable from a few yards away, whilst other markings are heavy and form a fine contrast. I prefer the heavy markings, but it is entirely a matter of taste. Another of the monochrome photographs (Fig. 54) is of a single spike of 'Belle Meade,' a splendid blue-and-white plicata exhibited at the last Chelsea Show. A special feature of this Iris is its branching. At times during the Chelsea Show there were five flowers fully open at the same time, and the exhibit received its fair share of admiration. Other good plicatas can be seen at any representative exhibit of Irises at Westminster or Chelsea, and most Iris growers have a sprinkling of them in their collections.

In addition to the various groups described above there are "amoenas" (Irises which have white standards and coloured falls), "bitones" (with standards of the same colour as the falls, but lighter in shade), "blends" (with several colours merging together in different ways), and other interesting groups. Almost every year some new shade or colour combination is produced by a skilful or fortunate hybridizer, and the choice available becomes wider and more exciting.

A good example of a "flaring" Iris is 'Starshine,' also illustrated in monochrome (Fig. 53), a variety which attractively combines white with shades of deep cream and pearly blue. The falls, instead of hanging down as those in most of the older varieties and some of the newer ones still do, are almost horizontal—in short, they flare. Flowers with this characteristic are nowadays much favoured especially when the petals are waved or ruffled. Another feature of the newer Irises is the breadth of the falls compared with the narrower and sometimes strap-like falls which were common years ago. It is possible that breeding for broad petals is overdone, because in some seedlings the falls overlap each other; but any excesses in this direction will soon be checked by the combined critical judgment of Iris growers in all countries.

Tall bearded Irises are amongst the easiest of plants to grow provided that their few simple requirements are met. They must be planted in a well-drained position which catches the sun for some part of the day. It is fatal to plant them in very wet places or in deep shade. They are

not fastidious about soil, but they prefer good loam to poor sand; and they will flourish on chalk when many other plants fade away. Once planted they can be left undisturbed for three or four years, but their roots should not be hidden amongst tall herbaceous plants which steal all the sunshine. The best time for planting is from about the fourth week of July to the middle of September. Firm planting is essential, and the top of each rhizome should be just above the level of the soil. Whilst rhizomes generally flower the first summer after being planted, they do not give their finest display until they have been established for two or three years. By that time each rhizome will have developed into a number of rhizomes and will provide a corresponding number of flowering stems or "spikes." If clumps of Irises are left undisturbed for more than three or four years the rhizomes become overcrowded and the flowers suffer both in quality and quantity. It is a good plan to replant about one-third of the Iris border each year. This evens out the work of replanting and ensures a fairly regular quantity of bloom each season.

Like all other plants Irises benefit from a reasonable enrichment of the soil, but the treatment given must depend on the type of soil available. Fresh manure should not be used at planting time, or as a mulch, because it tends to promote lush growth; but decayed manure, compost, leaf mould or hop manure can be used with advantage, particularly in sandy gardens like mine which are commonly found in Surrey. In such gardens the use of a lasting organic fertilizer is recommended—hair waste or crushed bones, for example—but these must be dug into the soil at planting time. Although not essential, an occasional light top-dressing of bone meal, superphosphate of lime, dried blood or any general fertilizer will benefit the plants and help to produce those larger flowers which gain glory on the show bench; but nitrogenous fertilizers should always be used sparingly or with care.

Although this article deals mainly with tall bearded Irises a brief mention must be made of the other types now so freely available. Some growers, attracted by the beauty and variety of the many species, concentrate on them to the exclusion of all else—and who shall dare to criticize these specialists? People with damp gardens, or living in districts with excessive rainfall, derive pleasure from the lovely hybrids of *I. Kaempferi* and *I. sibirica*. Except in weather of unusual severity *I. unguicularis* will flower throughout the winter, accompanied for shorter periods by *I. Danfordiae* and the varied forms of *I. reticulata*. In the early spring there are numerous dwarf Irises, and these are followed by the "intermediates." Throughout the first half of the year the species, whether grown in the border, the rockery or the cold greenhouse, will amply repay any trouble taken over them. Thus it is that the all-round grower can have Irises in flower from November to July—and then he needs an off-peak period lest he suffer from a surfeit of good things.

The present-day standard of what constitutes a good tall bearded Iris is very much higher than it was a few years ago, and the varieties

now available are, in the main, incomparably finer than the older ones. Such is the result of intensive hybridizing in different parts of the world. In several directions the advance has been so remarkable that one finds it difficult to suggest how further great improvements can be made. But no experienced writer on Irises will claim that perfection has been reached, because this claim has been injudiciously made from time to time in the past, always with amusing results. Undoubtedly further progress will be made, especially amongst new shades or combinations of colour and in important details such as branching and sturdiness of growth.

Even if no fresh varieties be introduced, however, there must be enough available for the time being to satisfy almost every taste and every type of gardener. People with a scientific bent can count chromosomes and study genetics: those who like constant change in their gardens can rearrange Irises to their hearts' content: whilst the great majority, who want to save labour and derive repeated pleasure from their plantings, can give their Irises a moderate amount of attention and then rest, horticulturally, on top of the world.

Finally, a word about Coronation Year and the desire we shall all have to see flowers in abundance. In the trial ground at Wisley there should be, towards the end of May and in the first half of June, a fine display of Irises raised in America and in England; and there ought to be a wide range of old and new varieties at the annual Show of the British Iris Society at Westminster on the 9th and 10th of June. Visitors will, I hope, admire these displays, and in doing so some of them might recall a free translation of a few lines written by VIRGIL about two thousand years ago—"So bedewed Iris, drawing a thousand varied hues from the smiling sun, descends from Heaven on saffron wings." VIRGIL's reference to the beautiful goddess of his time would not be inappropriate if made to her floral namesake of the present day.

MODERN AMERICAN DAYLILIES

Geddes Douglas

THE word "Hemerocallis" is not a pretty word. Such a word with equal fitness might be the name of a rare disease, a patent medicine, or an obscure celestial body, but actually it means "beautiful for a day" and denotes a genus of fine garden plants known to most gardeners as the "Daylily." There are only about fifteen recognized species* of Hemerocallis, mostly native to China, Siberia and Japan. Cytologically,

* *Bailey's Hortus Second* lists eleven species as follows: *H. aurantiaca; H. citrina; H. Dumortieri; H. flava; H. Forrestii; H. fulva; H. Middendorffii; H. minor; H. multiflora; H. nana; H. Thunbergii.* Recent additions include *H. altissima; H. esculenta; H. exaltata* and *H. plicata.*

except for triploid forms of *H. fulva*, they are diploids, having a chromosome count of 22. There are no known natural tetraploids, but polyploids have been induced artificially by the use of colchicine.

The several species and their hybrids exhibit certain horticultural differences. *H. aurantiaca* and its offspring tend to be evergreen; other types are deciduous.

The two species *H. Dumortieri* and *H. Middendorffii* have a closely formed involucrate flower head while derivatives from all other species of the dichotomous type are more or less widely branched.

Again, derivatives of the *fulva* group are apt to be stoloniferous, while other types are less rampant in their growth since they stem from a tight bundle of fleshy roots rather than from runners.

It is no exaggeration to say that the Daylily is enjoying a wave of unprecedented popularity. Though certain forms, such as *H. fulva* (the "Roadside Lily") and *H. flava* (the "Lemon Lily") were favourites in our grandmother's gardens, the modern American gardener acts as if he had only recently "discovered" the Daylily. Our Canadian friends to the north have established a test plot at the Royal Botanical Gardens in Hamilton, Ontario, and if letters from England, Australia, South Africa and Argentina are an indication, the Daylily's growing popularity will soon be worldwide.

In the United States there are two basic conditions which contribute materially to this trend. First is the rising cost of labour in this country. For purely financial reasons, gardeners have begun to realize the necessity of selecting plants that require a minimum of care. Second there is a change in the prevalent garden type. The era of the large formal garden of the wealthy seems to be passing, and in its place we now have the informally landscaped suburban acre of the moderately well-to-do average American family. This trend towards small, self-maintained gardens furthered the formation of thousands of women's garden clubs located in every city, town and hamlet in this vast country. The Daylily has become very popular with these young matrons, whose interest seems to be about equally divided between the social aspect of club work and actual out-of-doors gardening.

It seems to me that there are six very basic reasons for the Daylily's popularity. Ease of growth and freedom from disease certainly deserve to head this list. Here is a plant that is not particular as to the type of soil, *p*H content or kind of plant food. They seem to thrive equally well in the sand of Florida, the red clay of Alabama or the wind-deposited loam of Iowa. Acid soils found in New England tend to produce slightly deeper flower colours but no better growth than the alkaline condition found in certain areas of Texas. I have never seen a clone of Hemerocallis succumb to any disease or pest of any kind, and I have grown them personally for thirty-five years!

Adaptability to varying climatic conditions is another valid reason for popularity. Strange as it may seem the Daylily appears as happy in the sub-zero temperature of Canada and New England as it is in the

mild climate of California. By the same token DR. PHILIP CORLISS, a noted collector, reports complete success in Somerton, Arizona, where the summer temperatures reach as high as 120° F. Tennessee furnishes the final test with its drastic weather changes. For instance, on November 1, 1951, there was a temperature drop from 60° to —1° in a matter of 14 hours. This particular freeze killed many flowers and shrubs, but the Daylilies were quite unaffected.

The Daylily is a popular plant because it is agreeable with companions in any planting, and may be left in the border for many years without being disturbed. Another reason for its popularity is its season of bloom. In hot climates particularly, there is a dearth of midsummer blooming plants. The Daylily adequately fills this need. Length of the blooming period is another feature. An established Daylily clump blooms over a long period of time, usually from 6 to 8 weeks. Individual scapes contain from thirty to sixty flowers. Certain varieties will bloom much longer than others. For instance, 'Constance' has been known to bloom for 105 consecutive days. Individual blooms usually last only 1 day although many varieties now will remain open through the night and well into the second day.

A fifth point in its favour is the attractiveness of the plant itself. The foliage is pleasant, even in non-blooming periods. Plants may be selected with either tall or short scapes, according to the requirements of the garden situation. One point seldom mentioned is that though individual blooms are short-lived, new ones open each day with the result that a flowering clump presents daily an ever-changing garden picture.

Last but not least in my list of desirable attributes is the ease of raising seedlings. The early riser can beat the bees with hand pollination and with controlled crosses can produce fascinating results. Seeds planted in early winter germinate in the spring and about half of the young plants will bloom the first year. All will bloom by the second year. While it is becoming increasingly harder to produce new varieties superior to existing named sorts, nevertheless, seedlings will exhibit endless variation and a great proportion of them will be good garden plants.

To re-state the six reasons for the Daylily's popularity, they are: 1, ease of growth; 2, adaptability to climate; 3, no requirement for special growing conditions; 4, mid-summer blooming period; 5, good garden picture; 6, ease of raising seedlings. These and other reasons, no doubt, are responsible for such interest in the flower that there is now a specialized flower society devoted to the advancement of its culture and dissemination.

The Hemerocallis Society of America is an outgrowth of a localized group which was formerly known as the Mid-West Hemerocallis Society. Currently there are over 1,500 members in the United States, Canada and several foreign countries. The Society publishes a comprehensive Yearbook, promotes shows, exhibitions and garden tours

and each year holds an Annual Meeting attended by members from all parts of the country.

Modern varieties of Daylilies present great variation as to form and colour. A new development is the so-called "Spider" type. This is a large, loosely held flower, with narrow segment usually twisted and recurved, which is greatly valued for artistic arrangements. Another variation is a new type of flower being produced by MR. R. W. WHEELER of Winter Park, Florida. In this flower the sepal is practically non-existent. The petals are large, round and overlapping. Many of the introductions of MRS. THOMAS NESMITH are delightfully ruffled and frilled and have the advantage of opening in the late afternoon and remaining open all of the following day.

Persons who are not familiar with recent advances in Daylily hybridizing will be amazed at the variety and quality of the colours displayed by modern introductions. There are two people primarily responsible for this advance: DR. A. B. STOUT, of the Brooklyn Botanic Gardens, and MRS. THOMAS NESMITH, of Lowell, Mass. DR. STOUT has spent a lifetime studying Daylilies. He has written a book and many scientific papers on all aspects of Daylily culture and breeding and his experiments have produced an abundance of outstanding new varieties. Possibly his greatest contribution was the production of a series of deep bronzy reds so dark in colour that they appear to be purple. The first of these were marketed under the names of 'Theron,' 'Vulcan' and 'Woloff.' DR. STOUT made first use of the *H. fulva rosea* after its importation. His extensive use of *fulva*, both *fulva rosea* and 'Europa,' has imparted to his introductions hardiness and dependability. Also, his multiflora hybrids have won him wide recognition.

While introductions from MRS. NESMITH have been many in number, there has never been a sacrifice to quality in the amazing variety of subjects that has come from her deft hands. Her Daylilies are uniformly excellent in such things as hardiness, branching, flower form and the like. It is in colour, however, that she has excelled. 'Royal Ruby,' a flower coloured much as its name indicates, has opened a new field to the hybridizer. Her pinks are famous and for years have set a standard of excellence for all American breeders. These pinks were largely derived from *fulva rosea* which she obtained soon after its importation from China. The NESMITH reds and purples stem from a very small Daylily named 'Cissy Giuseppe,' an origination of MR. AMOS PERRY. Reds and purples are not known to have occurred in nature.

Many other breeders have contributed their share to the new American strain of Daylilies. The late SASS BROTHERS of Nebraska for years produced fine yellows and oranges. Two new Hemerocallis from the SASSES are 'Orange Beauty' and 'Hesperus,' a fine yellow. MR. CARL MILLIKEN of California is noted for his superb introductions of ruffled form such as in 'Ruffled Pinafore' and 'Colonial Dame.' 'Garnet Robe' is a MILLIKEN variety in high favour with American growers. MR. LEMOINE BECHTOLD of Colorado has contributed a series of clear yellows

unsurpassed as good garden subjects. 'Sceptre' and 'Desert Sunrise' are two of these. Currently he specializes in the so-called 'Spiders.' H. M. RUSSELL of Spring, Texas, has employed mass production methods in his Daylily business and has done much toward popularizing the flower with the average gardener. His fields of Lilies cover many acres and a plot of 50,000 to 100,000 seedlings is not an uncommon thing. 'Painted Lady,' a RUSSELL introduction, is a current favourite with American gardeners and won top honours in all award voting.

MR. R. W. WHEELER, in addition to giving us flowers of novel shape and form, specializes in bold, striking colours as seen in his 'Ruby Supreme.' His bicolor 'Bobolink' and its derivatives are outstanding, and recently he has produced a race of plum-coloured flowers in which the colour leans to the blue side rather than to the red.

Three other outstanding Florida hybridizers are MRS. BRIGHT TAYLOR of Ocala, noted for her 'Cluny Brown' and 'Lodestar'; MR. WYNDHAM HAYWARD of Winter Park, famed for the varieties 'Emperor Jones' and 'Minnie'; and PROF. JOHN V. WATKINS of Gainesville, whose red 'Kanapaha' is a long-time favourite. MRS. HUGH LESTER of Atlanta, Georgia, whose yellow is so aptly described by its name 'Lady Bountiful,' also specializes in pinks. Your correspondent is probably best known for his two introductions 'Pink Radiance' and 'Crimson Star,' both of which seem to be very popular with the Daylily addicts.

MR. PAUL COOK of Bluffton, Indiana, is a breeder of subtle blends, while MR. H. M. HILL and his son of Lafontaine, Kansas, are best known for the varieties 'Cibola,' 'Constance' and 'Kansan,' all very large-flowered Daylilies. In Little Rock, Arkansas, MR. JOE HOUSE, Past President of The Hemerocallis Society, and creator of the red 'Bess Vestal,' grows acres of seedlings.

Several scientists are represented in the list of Daylily breeders. DR. QUINN BUCK of California is currently working with the colchicine-induced polyploids. DR. H. P. TRAUB of the U.S. Department of Agriculture, and DR. E. J. KRAUS, formerly of the University of Chicago, are breeders of note.

The above-listed hybridizers are but a few of the hundreds of people who have turned their attention and efforts to the improvement of the Daylily. Hybridizing in Daylilies is still in its infancy, but, even so, careful breeding and selection within this group of plants is producing startling results. Pinks are now occurring in every tint and shade from palest shell pink to deepest rose. The reds are brilliant and far clearer than anything that has occurred in Irises, where intensive hybridizing has been going on for many years. The bronzy reds are now so deep in colour as to appear almost black. Gradually new colours are being bred into the evening bloomers which, in the past, were nearly all yellows. Even blue, a colour hitherto unknown in Hemerocallis is making an appearance in the new 'Lavenders,' so new in fact that they have not been released to the public.

While most breeders are primarily interested in colour, other considerations are not being neglected. Tall Daylilies for the back of the border are being bred with open flowers designed to face the viewer at eye level. Short Daylilies for the front of the border are being bred to hold their blossoms in a tilted manner so that the full colour effect is apparent to a person viewing them from above. Flower types are being selected for their ruffledness, wide and overlapping segments. The scape is receiving much attention since the number of buds indicates the length of blooming period.

This Asiatic plant was first given to the world by English collectors. The first serious hybridizing was done by an Englishman, MR. AMOS PERRY and breeding on a small scale has been carried on since. The Americans "took over," as we say in this country, at this point with their usual energy and determination, attacked the problem of bettering nature's original forms. Now we are able to give back to our English friends a truly remarkable flower which has been developed in a very short time, but one in which the development is in its infancy and where the latent possibilities are as great as they are unknown. I can heartily recommend, if you have not already done so, that you try a dozen or so of the *new* Hemerocallis. And, if you are a student of genetics or simply a layman gardener with that certain curiosity found in many who are amateur breeders, I recommend that you try raising a few hundred Daylily seedlings each year. They will amaze and delight you.

No discussion of the Daylily would be complete without a list of recommended varieties. The following list of twenty most popular varieties was selected by popular vote of the members of the Hemerocallis Society in 1952. While not necessarily the newest or the best, the individual varieties cover the entire colour range and are the current favourites with American growers.

HEIGHT INCHES	RANK	NAME	ORIGINATOR	COLOUR	SEASON
34	1	'Painted Lady'	Russell	golden tan	MLa
38	2	'Potentate'	Nesmith	deep purple red	MLa
36	3	'Georgia' (Fig. 56)	Stout	peach pink	M
36	4	'Dauntless'	Stout	pale yellow orange	MLa
38	5	'Caballero'	Stout	rose petals, yellow sepals	M
40	6	'Hesperus'	H. P. Sass	lemon chrome	MLa
36	7	'Revolute'	H. P. Sass	clear yellow	M
40	8	'Garnet Robe'	Milliken	deep garnet red	M
40	9	'Pink Charm'	Nesmith	peach pink	M
34	10	'High Noon'	Milliken	yellow self	M
36	11	'Colonial Dame'	Milliken	parchment	M
38	12	'Mrs. Hugh Johnson'	Russell	medium red	M
38	13	'Mrs. B. F. Bonner'	Russell	medium yellow	M
40	14	'Black Prince'	Russell	bronzy purple	M
38	15	'Prima Donna'	B. Taylor	red blend	MLa
38	16	'Royal Ruby'	Nesmith	crimson red	M

HEIGHT INCHES	RANK	NAME	ORIGINATOR	COLOUR	SEASON
44	17	'Mission Bells'	Hall	yellow self	M
40	18	'Maid Marian'	Lester	pink self	M
38	19	'Patricia'	Stout	pale yellow (evening bloomer)	E
38	20	'Athlone'	Russell	buff and chestnut brown	MLa

NOTES FROM FELLOWS

Primula aureata in Nepal

IN 1935, there was received at the Royal Botanic Garden, Edinburgh, from the Lloyd Botanic Garden, Darjeeling, various packets of seeds, one of them labelled *Swertia purpurea*. The seeds were sown and the germination of those of the Swertia was good. But among the Swertia seedlings there was one quite distinct from the others. This was pricked out from the rest and soon it was clear that we were dealing not with a Swertia but with a Primula of the Petiolares section. And when our solitary plant opened its flower buds to reveal yellow flowers, each deeply flushed with orange around the mouth, it was obvious that here was a Primula not only quite new to cultivation but one which was unrepresented among the ample Primula collections in the Herbaria of Kew, the British Museum, Edinburgh, Calcutta and Dehra Dun. A painting of the plant in flower was sent to Darjeeling but no collector at the Lloyd Botanic Garden could vouch for having seen the like of it in the wild.

Though the single plant did not set seeds in Edinburgh it propagated readily by division as well as by leaf cuttings, and in a year or two ample stocks were available which Edinburgh was able to distribute to other Gardens. By 1941 this Primula could be considered to be established in cultivation. Obviously it was desirable to attach a name to the plant and, with some trepidation, finally I described it under the name of *P. aureata*. As the seeds of the Swertia and of the rest of the original consignment had been harvested in Sikkim, it was suggested that Sikkim was its native home.

In 1952, MRS. DESIRÉE PROUD sent to the Herbarium of the Botany Department of the British Museum, various fragments of plants which she had collected in Nepal. But among the fragments was an entire plant, in full flower and beautifully pressed, which MR. FRANK LUDLOW recognized immediately as *P. aureata*. This is the only known specimen of the plant to have been collected in the wild and MRS. PROUD has given me details of the habitat. She found a small colony of five or six plants on the steep slopes surrounding the head waters of the Thadi Khola, a tributary of the Gandak, and some 20 miles as the crow flies (but five days on foot) almost due north of Khatmandu. The plants were growing

at an altitude of 11,500 ft., on a south slope, under a large rock at the edge of a stream, and close beside a path which has been made by pilgrims journeying to the sacred lakes of Gosainkund at about 15,000 ft. altitude. In full flower during the first two weeks of May, the plants must have had their roots in water, for when MRS. PROUD dug up the plant she sent to the British Museum, the hole immediately became filled with water.

H. R. FLETCHER, PH.D., D.SC.

Daphnes

DR. AMSLER's paper on Daphnes is so valuable and comprehensive that it may be worth while pointing out one or two errors and omissions. There are two misspellings: *Staphii* and *guidoides* should of course read *Stapfii* and *gnidioides*.

D. oleoides—DR. AMSLER describes the flowers as purple. In his original description SCHREBER gave the colour as white, as did SIBTHORP in his *Flora Graeca*, and HALACSY in his. REHDER says "white to pale lilac," and BEAN "purplish rose to tinted white," but MR. WALTER INGWERSEN, who has seen acres of this Daphne in Bulgaria and elsewhere, tells me they were all white, except for a single plant faintly tinged with pink. Many of the plants now grown as *D. oleoides* are not true, and until more is known those with other than white flowers should be treated with caution. *D. buxifolia*, which is sometimes offered, is merely a form, differing only slightly from the type.

D. jasminea—Though this plant is not so far as I know, in cultivation, DR. AMSLER is, I think, a little hasty in writing it off as, from the original description by SIBTHORP and SMITH, it should be most attractive: a mat of twisting branches like *Salix herbacea* with fragrant flowers, purple outside and white inside.

D. Cneorum alba—DR. AMSLER's suggestion that this is an albino of *D. Cnoerum* var. *pygmaea* is, I feel sure, correct. I grow both plants and their habit is identical, compact and prostrate; both have the same small obtuse, mucronulate leaves, about 1 cm. long by 4 mm. wide. But this does not altogether solve the problem. *D. Cneorum* var. *pygmaea* was originally described by DR. STOKER (*New Flora & Sylva*, vii, pp. 275/276) from material collected in the Venetian Alps in 1930. Most of the plants growing in this country to-day probably spring from the plant collected by MRS. J. D. NORTH before the war in the Pyrenees. The original *D. Cneorum alba* was found by CORREVON in the Jura. So it seems that *pygmaea* must have a fairly wide distribution, and if so it is odd that it should not apparently have been described earlier. One thing is certain: var. *alba* has nothing to do with var. *Verlotii* as has been suggested. *Verlotii's* leaves are linear-lanceolate and acute, and up to 2·5 cm. long, while those of *D. Cneorum* are rounded and blunt. Whether true *Verlotii* is in cultivation, I do not know. This plant was originally described as a species by GRENIER and GODRON from some

plants found near Grenoble by VERLOT in 1856 and reduced a year later by MEISSNER to rank as a form of *D. Cneorum*. I have not found any authoritative reference to a location for it in the Pyrenees and it seems to be confined to the Central Alps.

D. japonica and *D. odora*—The main difference between these two is that *japonica* has flowers in the axils as well as in terminal clusters. Both have forms in which the leaves are edged with creamy white (*aureo-marginata*) and this form seems to be hardier than the type. *D. japonica* is rare, but *odora*, particularly in the variegated form, is widely grown.

D. × *hybrida*—The great value of this shrub is that it puts forth its sweetly scented flowers very late in the autumn and right through the winter.

D. cannabina—This name is non-existent as WALLICH's original description was based on a mis-identification of two separate species, *Bholua* and *papyracea*. Both are tallish plants, *Bholua* having scented white flowers suffused with reddish purple, whereas the flowers of *papyracea* are white and unscented. There is a related species, *Sureil*, which grows to 6 feet or more, with dull ivory white flowers, less heavily scented than those of *Bholua*. All three species are in cultivation but their hardiness is doubtful.

D. tangutica—This was originally introduced by REGINALD FARRER from his expedition to Kansu in 1914–15. There are two forms, one with rosy purple flowers and dark leaves of the same colour as *D. retusa* and another with paler leaves and creamy white flowers. This last seems to be rare in cultivation, but was well grown by the late DR. JENKIN at Hindhead. It corresponds with FARRER's No. F553, while the rosy purple form springs from F271, though there may have been later importations.

D. neapolitana—This plant has never been satisfactorily determined. Although originally regarded as a form of *D. collina* it is now usually considered to be a hybrid between *oleoides* and *Cneorum* or *collina* and *Cneorum*. The comparative hairiness of the leaves is an uncertain criterion, but the underneath of *neapolitana's* leaves is much more glaucous. Seen from above, *collina's* leaves are deep green, whereas *neapolitana's* are more ashen. The third related species, *D. sericea*, can always be recognized by its pointed leaves, whereas those of the other two are blunt. Incidentally, FARRER is quite wrong in saying that "*D. sericea* is *D. collina* of SMITH and *D. neapolitana* of LODDIGES."

Although DR. AMSLER mentioned some Daphnes not in cultivation, he left out a number that are. These include *acutiloba*, a poorish leggy thing with greenish white flowers; *Bholua* and *Sureil*, which have already been mentioned; 'Thauma,' the hybrid between *petraea* and *striata*, which FARRER found on the Cima Tombea; 'Rosettii,' a hybrid evergreen with attractive leaves, but which hardly ever flowers; *Giraldii*, an erect shrub with yellow flowers, and *Mezereum* var. *grandiflora* (*autumnalis*) a form which blooms in the autumn and winter.

ELIOT HODGKIN

Twyford, Berks.

A New Site for Parochetus communis

I have lately had the privilege of meeting MRS. GOSCHEN, who before her marriage was VIVIENNE DE WATTEVILLE and accompanied her father BERNARD DE WATTEVILLE in his big-game hunting expedition to obtain specimens for the Bern Museum, the finest collection of African fauna in Europe. In the course of conversation she spoke of climbing Ol Doinyo Orok (the Black Mountain), an 8,374-foot peak on the borders of Kenya and Tanganyika and about sixty miles north-west of Kilimanjaro, during her second expedition to Kenya in 1928. Her native followers were completely scared, as the mountain was full of game including some very aggressive rhinos and, moreover, it was a virgin peak. Emerging above the forest area and nearing the summit, she suddenly came upon a stretch of *Parochetus communis*, over which hovered a quantity of small butterflies of the same entrancing blue as the flowers.

I was greatly interested in this quite new site for this plant, as my recollection was that it was always said to be a native of the Himalayas. I looked up all the books available and they all gave the Himalayas as its habitat. Messrs. Ingwersen's new catalogue says India. Only REGINALD FARRER in *The English Rock Garden* says "the East Indies and Central Africa (so it is said)," evidently rather throwing doubt on this site. MR. CLARENCE ELLIOTT in *Rock Garden Plants* does not mention its habitat but says "It is an extremely pretty plant and looks charming by the rock garden stream or pool, though there is nothing alpine about it." Seeing that the plant has been found growing at the height of about 8,000 feet, I feel it is only fair that it should be entitled to enter the august ranks of the "Alpines."

An account of the ascent of the mountain and the finding of the Parochetus is contained in MISS VIVIENNE DE WATTEVILLE'S book ***Speak to the Earth*** (Methuen).

H. ROGER SMITH

A Lysichitum Hybrid

That the Lysichitum which has occurred here, as well as elsewhere, with ivory-yellow spathes is a hybrid between the yellow-flowered *L. americanum* and the white *L. camtschatense*, may demand proof which a mere layman is unable to give. Even so, I am fairly well convinced that it is the result of a natural cross between the two species, since the plant shows characteristics common to both, that is, in foliage as well as flower colour. In time of blooming, too, it follows the yellow and precedes the white. Further, while we had grown the American plant for over 20 years without detecting the slightest divergence from type in the offspring it so freely produced along the watersides, it was not until the white-flowered Japanese had settled down, that the ivory-yellow presumed hybrid appeared. I have not much doubt but that

L. americanum is the seed parent, and would add that the garden value of the hybrid, beyond providing an interesting incident, does not compete with that of either of the species. So far, *L. americanum* is much the more fecund as a colonizer. It is, indeed, so vigorous that one may foresee the day when it will be claiming a place in our naturalized exotic Flora. Should it thus become firmly established in ditches and watercourses nothing less than a bulldozer will be required to dig out its deep and tenacious roots.

A. T. JOHNSON

Mimulus × *Bartonianus*

This Mimulus seems to have gone the way of many other good plants, for it has failed to appear in any of the nursery lists which have come my way for some years, nor have I seen it in gardens. A hybrid between *M. cardinalis* and *M. Lewisii*, it was a sound and tolerably hardy herbaceous perennial, raising from a broad woody base branching stems up to 3 feet in height with a width of 4 or more feet. The viscous, grey-green leaves made a telling background for the large rose-pink, yellow-throated blossoms which were borne in profusion during the greater part of summer, and, after cutting-back, there would be a secondary crop of flowering stems in autumn. We grew this fine plant in a medium border soil, rather more moist than most perhaps, and it never asked or received any attention beyond a spring mulch. The scarlet-flowered variety which G. N. SMITH, late of Daisy Hill, Newry, discovered as a branch sport on *M.* × *Bartonianus*, was equally good in its own way—a most striking plant when isolated with a background of ferns. This seems to have become as rare as the original. We saw the last of both during the war years and it would be interesting to learn if they still exist. These plants are unique in colour and habit among their kind, and it would be a loss to gardens if they had to be written off as extinct.

A. T. JOHNSON

A NEW SPECIES OF DELPHINIUM FROM BHUTAN

A. W. Exell and D. Hillcoat

As the Delphinium hybrids become ever more monstrous in size and almost shattering to the eye in their mass effect, it is a relief to turn to a charming little Alpine species collected by F. LUDLOW and G. SHERRIFF in sandy screes at about 15,000 feet in Bhutan. The collectors were immediately struck by its possibilities and noted it as "a fine rock-garden plant," and such it proves to be.

DR. H. F. DOVASTON of the West of Scotland Agricultural College, received seed of *Ludlow, Sherriff & Hicks* 19399 in December, 1949, and

sowed it the following January in John Innes Seed Compost. Germination followed between April and June and the seedlings were pricked out into John Innes Potting Compost with an extra dose of grit. When the leaves died the rootstocks were shaken out and repotted. The plants first flowered in May–June, 1951, and the same plants flowered abundantly in 1952.

DR. DOVASTON, to whom we are indebted for all this information as well as for sending us photographs, one of which is reproduced (Fig. 59), gives the following cultural instructions:

"Sow in gritty John Innes Seed Compost, prick out into very gritty John Innes Seed (*not* Potting) Compost, grow on for a year in full sun and then plant out in a scree which is not too dry but poor in nitrogen."

Plants in rich soil in a shade frame grew 9 inches high and were loose-growing and straggly, but in pots of gritty soil and in scree in the open they grew only 2–3 inches in height and remained compact and bushy. Overfeeding should be carefully avoided.

DR. DOVASTON further notes that *Ludlow, Sherriff & Hicks* 19399 "is a sound perennial and absolutely hardy. It does not seem to be sensitive to winter rain provided it has good drainage."

As DR. GEORGE TAYLOR has grown the plant successfully at Loudwater, near Rickmansworth, it is clearly quite tolerant of a considerable range of climate.

One word of warning is necessary as regards the seed of *Ludlow, Sherriff & Hicks* 19399. There is some suspicion that this was mixed. MR. W. C. BUCHANAN (according to DR. DOVASTON) obtained from his sample, in addition to the species here described, a late (Aug.–Sept.) flowering Delphinium with plum-purple flowers growing up to 9 inches high.

MR. BUCHANAN'S account of our new species (in a letter to DR. TAYLOR) is also worth quoting. "About the wee Delphinium, I have it growing in scree but I have a feeling that it will do better in light, sandy loam. With me it grows about 3 to 4 inches high with ten or twelve stems and one huge flower on each stem, a lovely blue with a white beard. One had a yellow beard. The flowers are almost as big as those of some of the tall hybrids. It has lovely lace-like foliage which also adds to its attractiveness."

Finally we give MR. JACK DRAKE'S experience with the plant at Aviemore, Inverness-shire:

"We have flowered it well here and it has set copious seed. I have been told that it is monocarpic but it has proved quite perennial here and has flowered for two seasons. I must admit that unprotected plants in the scree disappeared in the winter, but those covered with a bit of glass came through quite well with no losses at all. I think that, possibly, the scree is too arid a place for them and I am going to try planting in richer soil next spring. It is a first rate little plant which I hope has come to stay."

After seeing these cultural notes from various sources, which may

at first sight appear slightly conflicting, DR. DOVASTON sums up as follows: "I think there is very little difference of opinion between the four of us who have grown this plant. The main point in common is that it should not be regarded as a plant for a dry and arid scree. My point that it is best grown in a fairly rich soil (by alpine standards) applies solely to the propagating phase. I am always a little scared of growing Delphiniums in a very poor mixture for the first year in case they flower profusely and fail to develop a perennial rootstock."

After these hints on cultivation, which should be useful, we proceed to a description of the species and a few words on its affinities.

Delphinium muscosum Exell & Hillcoat, sp. nov. (Text Fig., p. 184)

Herba perennis, 10–15 cm. alta. *Caulis* brevis basi multiramosus vel nonnunquam 2–3 cm. longus hirsuto-pilosus. *Folia* basalia longe petiolata, petiolo ad 7 cm. longo pubescenti-piloso basi applanato, lamina ambitu suborbiculare 2–3 cm. in diam. usque ad basin 3-palmatisecta segmentis secondariis 3–4 palmatisectis, segmentis ultimis linearibus, pubescenti-pilosa, pilis subrigidis, caulinares petiolo breviore vel subsessilia. *Inflorescentiae* cymoso-ramosae subcorymbosae. *Flores* ad apices ramulorum inflorescentiarum solitarii, atro-caerulei, atro-caeruleo-violacei vel atro-violacei, 3–3·5 cm. longi. *Sepala* extus hirsuto-pilosa, dorsalis intus fere glabrum lamina elliptico-ovata, 25 × 15 mm., calcare 14 × 4·5 mm., 2 lateralia spathulata 22 × 11 mm., 2 ventralia ovata vel oblongo-ovata leviter obtuse acuminata, 23 × 14 mm., intus glabra. *Petala* 2 dorsalia anguste elliptica margine incurvata, 26 × 4 mm., extus fere glabra intus pubescentia, 2 lateralia unguiculata lamina irregulariter ovata 10–12 × 6–8 mm. basin versus flavo- vel albo-barbulata ungue 6–7 mm. longo. *Stamina* circa 28, filamentis 7–8 mm. longis basin versus applanatis 1·5 mm. latis glabris, antheris 1·2 × 0·5 mm. *Carpella* 3, 5 × 1·5 mm., tomentella.

BHUTAN. Rinchen Chu, alt. 15,500 ft., 7. viii. 1937, *Ludlow & Sherriff* 3537 (BM, type), "Perianth deep rich blue violet (same colour as *Primula macrophylla*) with a small patch of yellow hairs at throat. Hairs on outside of sepals yellowish. Growing in open, small-stoned, wet scree"; Saga La, alt. 15,500 ft., 14. vii. 1949, *Ludlow, Sherriff & Hicks* 16825 (BM), "Perianth pale purple. In damp, sandy scree"; Omta Tso, 11. viii. 1949, *Ludlow & Sherriff* 17102 (BM), "Perianth purple. In gravelly scree"; Pangotang, alt. 15,500 ft., 3. vii. 1949, *Ludlow, Sherriff & Hicks* 19328 (BM), "Perianth deepest blue violet. In steep, sand scree, below crumbling cliff"; Marlung, alt. 15,000 ft., *Ludlow, Sherriff & Hicks* 19375 (BM), "Perianth bright blue-violet, white lip. Spur reddish. Only one seen. In sandy, steep scree"; Marlung, Tsampa, alt. 15,500 ft., 11. vii. 1949, *Ludlow, Sherriff & Hicks* 19390 (BM), "Perianth deepest violet, pale in the throat. In open, steep, sandy scree"; Tolegang, Tsampa, alt. 15,000 ft., 10. ix. 1949, *Ludlow, Sherriff & Hicks* 19725 (BM), "Perianth dark intense blue with some yellow showing at tip of segments outside. Only in open, sandy scree. A fine rock garden plant."

This species is characterized by its very small size, by the finely dissected leaves and by the sympodial inflorescence. Many of the wild specimens appear practically stemless. The flowering axis terminates in a large, solitary flower. From the axils of one or more shortly stalked leaves on the flower-stem arise branches again terminating in

TEXT FIG.—*Delphinium muscosum* Exell & Hillcoat

A. General habit, × ⅔; **B.** Leaf, × 1½; **C.** Flower-bud, × 1½; **D.** Flower, × 1½; **E.** Dorsal sepal, × 1½; **F.** Lateral sepal, × 1½; **G.** Ventral sepal, × 1½; **H.** Lateral petal, × 1½; **I.** Dorsal petal, × 1½; **J.** Androecium and Gynoecium, × 3½ **K.** Stamens, × 6; **L.** Carpels × 6.

(Ludlow & Sherriff 3537)

flowers and producing in their turn further branches, the process presumably continuing until the end of the flowering season.

We have found no really closely related species. *Delphinium calcicola* W. W. Sm. from the Lichiang Range, Yunnan, is somewhat similar in stature and general appearance, having relatively large, solitary blue flowers. The leaves are not quite so finely dissected, the indumentum is of a finer, shorter nature and the spur relatively longer. Of a similar appearance and indeed closer in indumentum character, though once more with less finely divided leaves and relatively longer spurs, are some specimens of *Ludlow & Sherriff* 2400 (BM) from Kashong La in S. Tibet (other specimens, doubtless the same species, under the same number, have quite elongated inflorescences).

This plant (*Ludlow & Sherriff* 1968, 1977 and 2400) has been tentatively identified from the description and plate as *Delphinium candelabrum* Ostenf., and might also make a good alpine if it could be kept to the dwarf form exhibited by some of the specimens.

The epithet *muscosum* was chosen for our species because of the mossy appearance of the hairy, finely divided leaves. In cultivated specimens (see photograph) (Fig. 59) the leaves are much less finely divided than in the wild ones.

The plate was drawn by Miss Margaret Stones.

PLANTS TO WHICH AWARDS HAVE BEEN MADE IN 1953

Buddleia × 'Madagasiatica' var. 'Margaret Pike' A.M. February 17, 1953. A very desirable winter-flowering shrub for the cold greenhouse, raised from the cross *Buddleia madagascariensis* × *B. asiatica*. It is a plant of very rapid growth, with slender, wand-like branches bearing dull grey-green leaves up to 7 inches long and covered beneath, as are the stems, with a white indumentum. The small, Saffron Yellow (H.C.C. 7) flowers are borne in dense racemes up to 8 inches long developed at the tips of the shoots and on a number of short lateral branches. Raised and exhibited by Mr. A. V. Pike, Threshers Field, Chiddingstone, Kent.

Rhododendron seinghkuense, A.M. February 3, 1953. A small spreading undershrub of the Series Edgeworthii collected by Kingdon Ward in Upper Burma. The short-jointed, twiggy branchlets bear ovate-oblong, bullate leaves up to 2½ inches long and 1½ inch wide, covered beneath with brownish tomentum. The terminal inflorescences consist of one or two flowers each, the flower having a broadly bell-shaped sulphur-yellow corolla 1½ inch across and short stamens bearing red-brown anthers. In most parts of the British Isles it is only suitable for the cool greenhouse, where it is one of the earliest to flower. Exhibited by the Commissioners of Crown Lands, Windsor Great Park, Windsor, Berks.

Cymbidium 'Miretta' var. 'Sydney,' F.C.C. February 3, 1953. A very handsome hybrid raised from the cross *C.* 'Claudette' var. 'Invicta' × *C.* 'Mirabel.' The robust inflorescence carried nine large rounded flowers nearly 5 inches across, with broad incurved sepals and petals of apple green and a cream-coloured lip marked with reddish-brown. Exhibited by S. Tharp, Esq., 10 Farm Lane, Sanderstead, Surrey.

Cymbidium 'Cygnus' A.M. February 17, 1953. A hybrid from the cross 'Coningsbyanum' 'Brockhurst Var.' × 'Alexanderi' 'Westonbirt Var.' The spike shown bore five flowers each 4 inches across, with broad, slightly incurved perianth segments of ivory-white tinged greenish on the reverse. The white lip had an undulate margin and was attractively spotted with deep crimson. Raised and exhibited by Messrs. Black & Flory, Ltd., Slough, Bucks.

Cymbidium 'Flare' var. 'Redwing' A.M. February 17, 1953. A cross between 'Edzell' var. 'John Linfold' and 'Rio Rita' var. 'Radiant' produced this very pleasing hybrid, which has flowers 4 inches in diameter with flattish segments tending to recurve at their tips. In the plant exhibited the stout spike bore ten flowers. The buff ground colour is heavily veined and clouded with rosy bronze, and the white-margined lip is deep maroon-crimson. Exhibited by Lord Hothfield, Castle Hill, Englefield Green, Egham, Surrey.

Odontioda 'Melina' var. 'Heliotrope,' A.M. January 6, 1953. This is a very large flowered Odontioda with individual flowers $3\frac{1}{4}$ inches across. The plant exhibited carried a spike bearing 11 flowers. The basic colour was a pale heliotrope with large reddish brown blotches at the base of the sepals and petals. The petals were fringed at the margins. The centre of the labellum was a pale yellow with an additional brown blotch. Raised and exhibited by Messrs. Charlesworth & Co. Ltd., Lewes Road, Haywards Heath.

Odontoglossum 'Durrington' var. 'Eclipse' A.M. February 17, 1953. The parentage of this plant is 'Derwent' × 'Phantasy.' The spike bore five flat flowers $3\frac{1}{2}$ inches across, with crimped and fimbriate margins. The ground colour is white and the segments are heavily blotched with dark maroon-purple. Raised and exhibited by Messrs. Stuart Low Co., Jarvis Brook, Sussex.

ERRATUM

Rhododendron giganteum. It is much regretted that owing to an error, the award to this Rhododendron given on February 17th, 1953, was wrongly published in the April issue of the JOURNAL on page 139 and in Fig. 40 as **A.M.** This should have been **F.C.C.**

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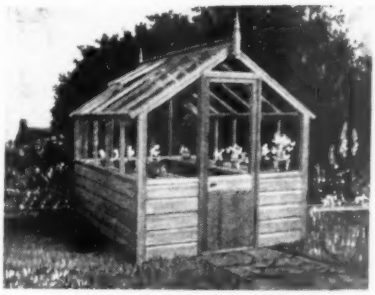

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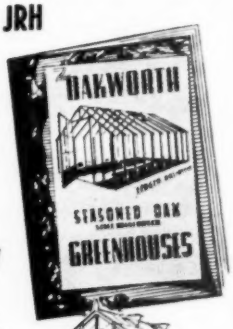

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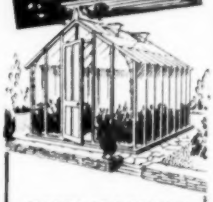

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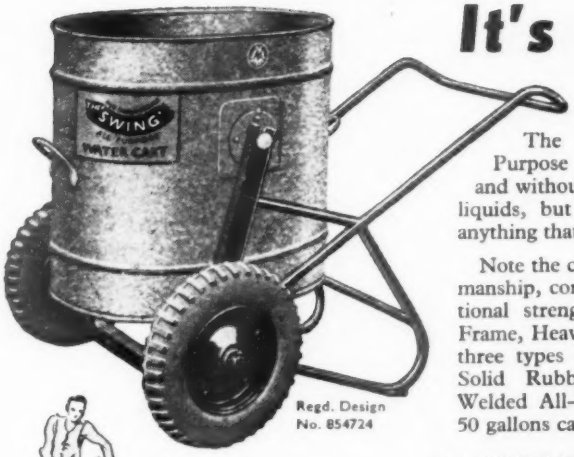

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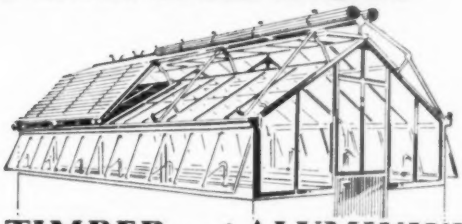

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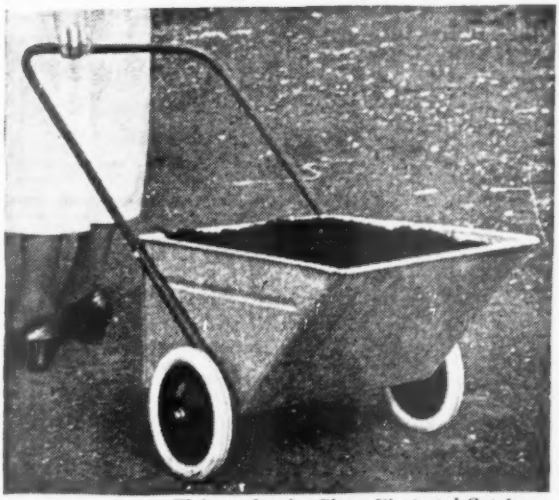

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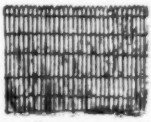

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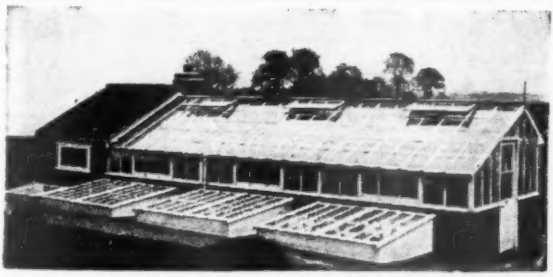

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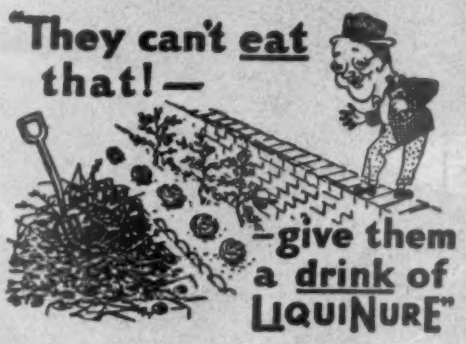

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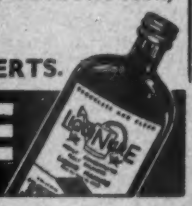

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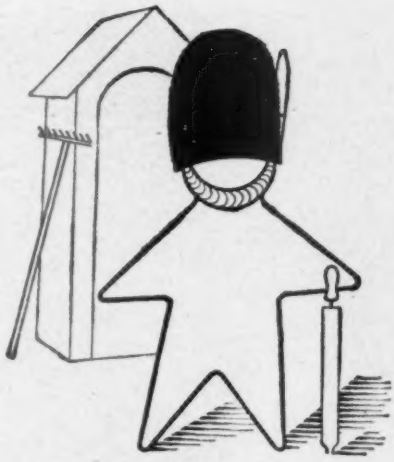

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